

*Liebert® eXL™*

*Installation Manual — 625-800kVA, 1.0PF, 60Hz, Three-Phase, Single-Module*



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Rating: \_\_\_\_\_

Date purchased: \_\_\_\_\_

Date installed: \_\_\_\_\_

Location: \_\_\_\_\_

Input voltage/frequency: \_\_\_\_\_

Output voltage/frequency: \_\_\_\_\_

Battery reserve time: \_\_\_\_\_

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## IMPORTANT SAFETY INSTRUCTIONS

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### SAVE THESE INSTRUCTIONS

This manual contains important instructions that should be followed during installation of your Liebert eXL UPS. Read this manual thoroughly, paying special attention to the sections that apply to your installation, before working with the UPS. **Retain this manual for use by installing personnel.**



### WARNING

Risk of electrical shock. Can cause personal injury or death.

This UPS has several circuits that are energized with high DC as well as AC voltages. Check for voltage with both AC and DC voltmeters before working within the UPS. Check for voltage with both AC and DC voltmeters before making contact.

Only properly trained and qualified personnel wearing appropriate safety headgear, gloves, shoes and glasses should be involved in installing the UPS or preparing the UPS for installation. When performing maintenance with any part of the equipment under power, service personnel and test equipment should be standing on rubber mats.

In case of fire involving electrical equipment, use only carbon dioxide fire extinguishers or those approved for use in fighting electrical fires.

Extreme caution is required when performing installation and maintenance.

Special safety precautions are required for procedures involving handling, installation and maintenance of the UPS system. Observe all safety precautions in this manual before handling or installing the UPS system. Observe all precautions in the Operation and Maintenance Manual, SL-26030, before as well as during performance of all maintenance procedures. Observe all DC safety precautions before working on or near the DC system.



### AVERTISSEMENT

Risque de décharge électrique pouvant causer des blessures graves, voire mortelles.

Ce système ASC comporte plusieurs circuits à haute tension c.a et c.c. Vérifiez les tensions au moyen de voltmètres c.a. et c.c. avant d'utiliser le système ASC. Vérifiez les tensions avec des voltmètres c.a. et c.c. avant d'établir tout contact.

Seuls des employés qualifiés et dûment formés portant un casque, des gants, des chaussures et des lunettes de sécurité adéquats doivent se charger d'installer le système ASC ou de le préparer pour l'installation. Les responsables de l'entretien et l'équipement d'essai doivent reposer sur des tapis de caoutchouc lors de toute intervention sur une pièce d'équipement sous tension.

En cas d'incendie associé à du matériel électrique, n'utilisez que des extincteurs à dioxyde de carbone ou homologués pour la lutte contre les incendies d'origine électrique.

Les opérations d'installation et d'entretien requièrent une extrême prudence.


Des précautions de sécurité spéciales sont requises pour les procédures associées à la manutention, à l'installation et à l'entretien du système ASC. Observez toutes les précautions de sécurité décrites dans le présent manuel avant de manipuler ou d'installer le système ASC. Observez également toutes les précautions décrites dans le manuel d'utilisation et d'entretien, SL-26030, avant et pendant toutes les procédures d'entretien. Observez toutes les précautions de sécurité appropriées lorsque vous travaillez sur à proximité d'une source c.c. de sécurité appropriées dès que vous vous trouvez à proximité d'une source c.c.



## WARNING

Risk of heavy unit falling over. Improper handling can cause equipment damage, injury or death.

Exercise extreme care when handling UPS cabinets to avoid equipment damage or injury to personnel. The UPS module weight is up to 5187 lb. (2353kg).

Locate center of gravity symbols  and determine unit weight before handling each cabinet. Test lift and balance the cabinets before transporting. Maintain minimum tilt from vertical at all times.

Slots at the base of the module cabinets are intended for forklift use. Base slots will support the unit only if the forks are completely beneath the unit.


Read all of the following instructions before attempting to move, lift, or remove packaging from unit, or prepare unit for installation.



## AVERTISSEMENT

Le centre de gravité élevé de l'appareil présente un risque de renversement. Une mauvaise manutention peut entraîner des dommages matériels, des blessures et même la mort.

Faites preuve d'une extrême prudence lors de la manutention des armoires ASC afin d'éviter de les endommager ou de blesser le personnel. Le module ASC pèse jusqu'à 2 353 kg (5 187 lb).

Identifiez les symboles de centre de gravité  et déterminez le poids de l'appareil avant de manipuler chaque armoire. Testez le levage et l'équilibre des armoires avant de transporter l'appareil. Maintenez en tout temps l'inclinaison verticale minimale.

Les fentes situées à la base des armoires du module sont conçues pour utiliser le chariot élévateur. Les fentes situées à la base peuvent soutenir le système seulement si les fourches se trouvent complètement sous le système.

Lisez toutes les instructions ci-dessous avant de tenter de déplacer, lever, déballer ou préparer le système en vue de son installation.



## WARNING

Risk of electrical shock and fire. Can cause equipment damage, personal injury or death.

Under typical operation and with all UPS doors closed, only normal safety precautions are necessary. The area around the UPS system should be kept free of puddles of water, excess moisture and debris.

Only test equipment designed for troubleshooting should be used. This is particularly true for oscilloscopes. Always check with an AC and DC voltmeter to ensure safety before making contact or using tools. Even when the power is turned Off, dangerously high potential electric charges may exist at the capacitor banks and at the DC connections.

All wiring must be installed by a properly trained and qualified electrician. All power and control wiring must comply with all applicable national, state and local codes.

One person should never work alone, even if all power is disconnected from the equipment. A second person should be standing by to assist and to summon help in case of an accident.



## AVERTISSEMENT

Risque de décharge électrique et d'incendie. pouvant entraîner des dommages matériels, des blessures et même la mort.

Les précautions de sécurité habituelles suffisent lorsque le système ASC est en mode de fonctionnement normal et que toutes les portes sont fermées. La zone entourant le système ASC doit être exempte de flaques d'eau, d'humidité excessive et de débris.

Seuls des équipements d'essai conçus pour le dépannage doivent être utilisés. Cette mise en garde couvre notamment les oscilloscopes. Utilisez toujours un voltmètre c.a. et c.c. pour vérifier les tensions avant d'établir un contact ou d'utiliser des appareils. Des tensions dangereusement élevées peuvent demeurer dans les batteries de condensateurs et au niveau des raccords c.c., même une fois l'alimentation coupée.

Tous les raccords doivent être effectués par un électricien dûment formé et qualifié. Tous les câbles d'alimentation et de commande doivent être conformes aux codes nationaux et locaux en vigueur.

Une personne ne devrait jamais travailler seule, même si toute l'alimentation d'entrée est coupée. Une deuxième personne devrait toujours être présente pour porter assistance ou chercher de l'aide en cas d'accident.



### NOTE

*Materials sold hereunder cannot be used in the patient vicinity (e.g., use where UL, cUL or IEC 60601-1 is required). Medical applications such as invasive procedures and electrical life support equipment are subject to additional terms and conditions.*

## NOTICE

If optional filtering is installed, this unit complies with the limits for a Class A digital device, pursuant to Part 15 Subpart J of the FCC rules. These limits provide reasonable protection against harmful interference in a commercial environment. This unit generates, uses and radiates radio frequency energy and, if not installed and used in accordance with this instruction manual, may cause harmful interference to radio communications. Operation of this unit in a residential area may cause harmful interference that the user must correct at his own expense.

## 1.0 MECHANICAL INSTALLATION

### 1.1 Introduction

This section describes the requirements that must be taken into account when planning the positioning and cabling of the Liebert eXL uninterruptible power supply and related equipment.

This chapter is a guide to general procedures and practices that should be observed by the installing personnel. The particular conditions of each site will determine the applicability of such procedures.



#### **WARNING**

Risk of electrical shock. Can cause injury or death.

Special care must be taken when working with the batteries associated with this equipment. When they are connected together, the battery terminal voltage will exceed 400VDC and is potentially lethal.



#### **AVERTISSEMENT**

Risque de décharge électrique pouvant causer des blessures graves, voire mortelles.

Des précautions particulières doivent être prises lors de travaux touchant les batteries associées à cet équipement.

Lorsque les batteries sont branchées ensemble, la tension à la borne d'une batterie dépasse 400 V c.c. et est potentiellement mortelle.



#### **NOTE**

*All equipment not referred to in this manual is shipped with details of its own mechanical and electrical installation.*

#### **NOTICE**

Three-phase input supply required.

The standard Liebert eXL UPS is suitable for connection to three-phase, three-wire (+ Earth) TN-C and TN-S.

#### **NOTICE**

Do not apply electrical power to the UPS equipment before the arrival of the commissioning engineer.

### 1.2 Preliminary Checks

Before installing the UPS, please carry out the following preliminary checks:

- Visually examine the UPS equipment for transit damage, both internally and externally. Report any damage to the shipper immediately.
- Verify that the correct equipment is being installed. The equipment supplied has an identification tag on the interior doors reporting the type, size and main calibration parameters of the UPS.
- Verify that the UPS room satisfies the environmental conditions stipulated in the equipment specification, paying particular attention to the ambient temperature and air exchange system.



## 1.3 Environmental Considerations

### 1.3.1 UPS Room

The UPS module is intended for indoor installation and should be located in a cool, dry, clean-air environment with adequate ventilation to keep the ambient temperature within the specified operating range (see **Environmental Parameters** in **Table 7**).

The Liebert eXL UPS is cooled with the aid of internal fans. To permit air to enter and exit and prevent overheating or malfunctioning, do not cover the ventilation openings.

The Liebert eXL UPS is equipped with air filters located behind the front doors. A schedule for inspection of the air filters is required. The period between inspections will depend upon environmental conditions.

When bottom entry is used, the conduit plate must be installed.



#### NOTE

*The UPS is suitable for mounting on concrete or other non-combustible surface only.*

### 1.3.2 Storage

Should the equipment not be installed immediately, it must be stored in a room for protection against excessive humidity and/or heat sources (see **Environmental Parameters** in **Table 7**).

## 1.4 Positioning

The cabinet is structurally designed to handle lifting from the base.

Access to the power terminals, auxiliary terminal blocks and power switches is from the front.

The door can be opened to give access to the power connection bars, auxiliary terminal blocks and power isolators. Front door can be opened to 90 degrees, and interior doors can be removed for more flexibility in installations.



#### NOTE

*The UPS must be placed on a non-combustible surface suitable to support the weight of the unit.*

### 1.4.1 Moving the Cabinets

The route to be travelled between the point of arrival and the unit's position must be planned to make sure that all passages are wide enough for the unit and that floors are capable of supporting its weight (for instance, check that doorways, lifts, ramps, etc. are adequate and that there are no impassable corners or changes in the level of corridors).

Ensure that the UPS weight is within the designated surface weight loading (lb/in<sup>2</sup>) of any handling equipment. For weight details, see **Table 7**.

The UPS can be handled with a forklift or similar equipment. Ensure any lifting equipment used in moving the UPS cabinet has sufficient lifting capacity. When moving the unit by forklift, care must be taken to protect the panels. Do not exceed a 15-degree tilt with the forklift. Bottom structure will support the unit only if the forks are completely beneath the unit.

Handling with straps is not authorized.




## WARNING

Risk of heavy unit falling over. Improper handling can cause equipment damage, injury or death.

Because the weight distribution in the cabinet is uneven, use extreme care while handling and transporting. Take extreme care when handling UPS cabinets to avoid equipment damage or injury to personnel.

The UPS module weight is up to 5187 lb. (2353kg).

Locate center of gravity symbols  and determine unit weight before handling each cabinet. Test lift and balance the cabinets before transporting. Maintain minimum tilt from vertical at all times.




## AVERTISSEMENT

Le centre de gravité élevé de l'appareil présente un risque de renversement. Une mauvaise manutention peut entraîner des dommages matériels, des blessures et même la mort.

En raison de la distribution inégale du poids de l'armoire, vous devez faire preuve d'extrême prudence lors de sa manipulation et de son transport. Faites preuve d'une extrême prudence lors de la manutention des armoires ASC afin d'éviter de les endommager ou de blesser le personnel.

Le module ASC pèse jusqu'à 2 353 kg (5 187 lb).

Identifiez les symboles de centre de gravité  et déterminez le poids de l'appareil avant de manipuler chaque armoire. Testez le levage et l'équilibre les armoires avant de transporter l'appareil. Maintenez en tout temps l'inclinaison verticale minimale

### 1.4.2 Clearances

The Liebert eXL has no ventilation grilles at either side or at the rear of the UPS. Clearance around the front of the equipment should be sufficient to permit free passage of personnel with the doors fully opened. It is important to leave a distance of 24in. (610mm) between the top of the UPS and any overhead obstacles to allow the module to be serviced and to permit adequate circulation of air coming out of the unit.

### 1.4.3 Raised-Floor Installations

If the equipment is to be located on a raised floor, it should be mounted on a pedestal suitably designed to accept the equipment point loading. Refer to **Figure 7** to design this pedestal.

### 1.4.4 Kick Plate Installation

If the unit is to be installed in a position that does not permit access to rear kick plates, then the kick plates should be installed before the unit is placed in its final position.

## 1.5 System Composition

A UPS system can include a number of equipment cabinets, depending on the individual system design requirements: e.g., UPS cabinet, battery cabinet, maintenance bypass cabinet. In general, all the cabinets used in a particular installation are of the same height. Refer to the drawings provided in **4.0 - Installation Drawings** for the positioning of the cabinets as shown in **Figure 1**.

## 1.6 Cable Entry

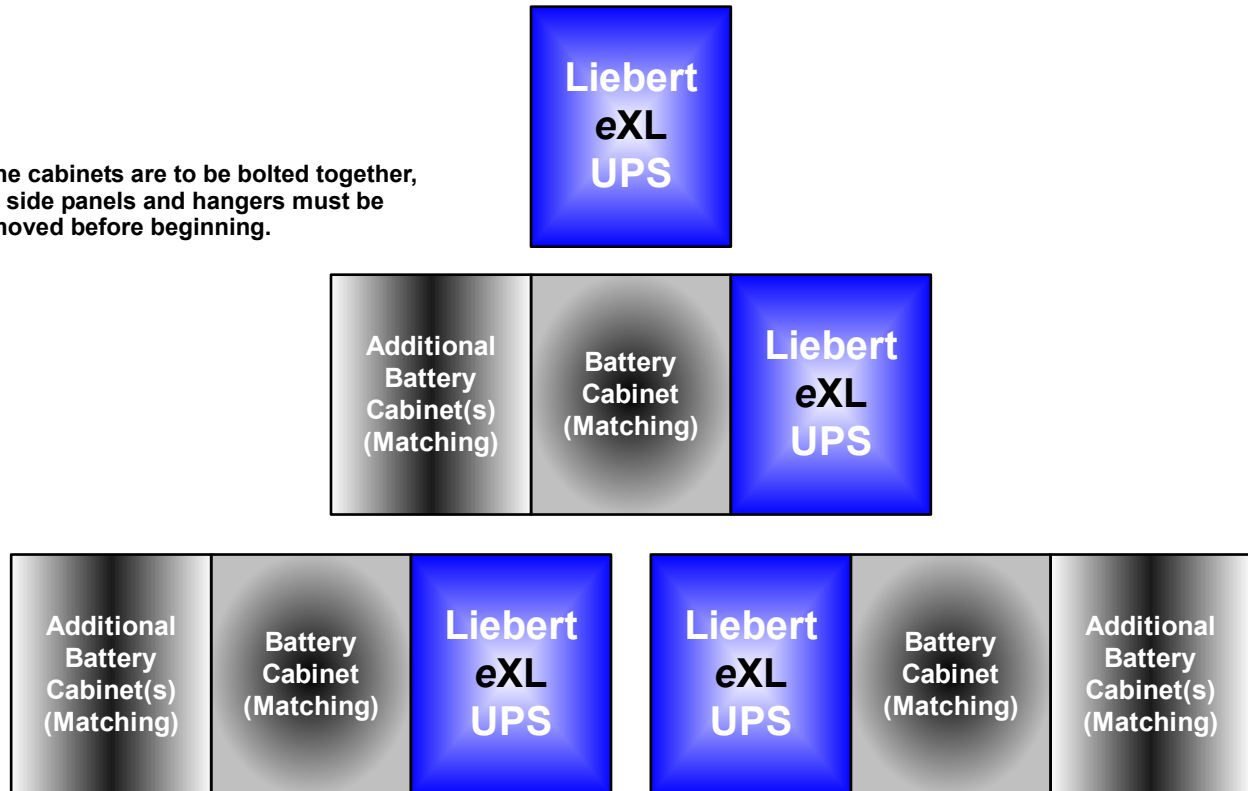
Cables can enter the UPS cabinet from bottom or top into the Input/Output (I/O) of the unit; see the figures in **4.0 - Installation Drawings**.

## 1.7 Cable routing

Per NEC 300.20 (NEC 2014 or equivalent), all phase conductors and ground conductors must be grouped together when they are installed in ferrous enclosures or go through ferrous material. This is to avoid heating from induction currents.

**Figure 1 Cabinet arrangement—Liebert eXL and battery cabinets**

If the cabinets are to be bolted together, the side panels and hangers must be removed before beginning.



Battery cabinets can be bolted to the left of the UPS and the cabling routed internally. Possible only with Energys front terminal batteries or equivalent batteries in a Liebert cabinet.

Battery cabinets can be bolted to the right of the UPS. However, the cabling must be routed externally.

## 2.0 UPS ELECTRICAL INSTALLATION

This chapter provides guidelines for qualified installers who must have knowledge of local wiring practices pertaining to the equipment to be installed.



### WARNING

Risk of electrical shock. Can cause injury or death.

The UPS contains high DC as well as AC voltages. Check for voltage with both AC and DC voltmeters before working within the UPS.

Only properly trained and qualified personnel wearing appropriate safety headgear, gloves, shoes and glasses should be involved in installing the UPS or preparing the UPS for installation.



### AVERTISSEMENT

Risque de décharge électrique pouvant causer des blessures graves, voire mortelles.

Le système ASC contient des tensions c.c. et c.a. élevées. Vérifiez les tensions au moyen de voltmètres c.a. et c.c. avant d'utiliser le système ASC.

Seuls des employés qualifiés et dûment formés portant un casque, des gants, des chaussures et des lunettes de sécurité adéquats doivent se charger d'installer le système ASC ou de le préparer pour l'installation.

## 2.1 External Protective Devices

For safety, circuit breakers must be installed in the input AC supply and external battery system. Given that every installation has its own characteristics, this section provides guidelines for qualified installation personnel with knowledge of operating practices, regulatory standards and the equipment to be installed.

External overcurrent protection must be provided. See **Figures 15, 16 and 17** for overload capacity.

## 2.2 Power Cables

The UPS requires both power and control cabling. All control cables, whether shielded or not, should be run separately from the power cables in metal conduits or metal ducts that are electrically bonded to the metalwork of the cabinets to which they are connected.

The cable design must comply with the voltages and currents in **Tables 8 through 11**, follow local wiring practices and take into consideration the environmental conditions (temperature and physical support media), room temperature and conditions of installation of the cable and system's overload capacity (see **5.0 - Specifications**).



### WARNING

Risk of electrical shock. Can cause injury or death.

Before cabling the UPS, ensure that you are aware of the location and operation of the external isolators that connect the UPS input/bypass supply to the power distribution panel.

Check that these supplies are electrically isolated, and post any necessary warning signs to prevent their inadvertent operation.



### AVERTISSEMENT

Risque de décharge électrique pouvant causer des blessures graves, voire mortelles.

Avant de procéder au câblage du système ASC, assurez-vous que vous êtes au courant de l'emplacement et du fonctionnement des isolateurs externes qui raccordent l'alimentation d'entrée ou de dérivation au panneau de distribution électrique.

Vérifiez que ces raccords sont isolés électriquement et installez tous les panneaux d'avertissement nécessaires pour empêcher leur utilisation accidentelle.

When sizing battery cables, a maximum voltage drop of 2VDC is permissible at the current ratings given in **Table 11**.

The following are guidelines only and are superseded by local regulations and codes of practice where applicable:

- The grounding conductor should be sized according to the fault rating, cable lengths, type of protection, etc. The grounding cable connecting the UPS to the main ground system must follow the most direct route possible.
- Consideration should be given to the use of paralleled smaller cables for heavy currents, as this can ease installation considerably.
- AC and DC cables must be run in conduits according to local codes, national codes and standard best practices. This will prevent creation of excess EMI fields.

## 2.3 Sizing the Input Breaker Feeding a Liebert eXL UPS

Nominal input current (considered continuous) is based on full-rated output load. Maximum current includes nominal input current and maximum battery recharge current (considered noncontinuous). Continuous and noncontinuous current are defined in the NEC.

Maximum input current is controlled by the current limit setting, which is adjustable. Values shown are for default current limit of 125%. If a smaller input feed breaker is used, the input current limit can be adjusted; see your Emerson representative for more information. The input current limit should not be set less than 105% of the current needed to support the inverter at full load for normal operation. This results in sufficient power to recharge the battery in a reasonable time and to operate over the published input voltage range.

### 2.3.1 Power Cable Connection Procedure

The rectifier input, bypass, output and battery power cables (all require lug-type terminations) are connected to busbars in the I/O sections (refer to **4.0 - Installation Drawings**).

#### Equipment Ground

The equipment ground busbars are in the I/O sections (refer to **4.0 - Installation Drawings**). The grounding conductor must be connected to the ground busbar and bonded to each cabinet in the system.

All cabinets and cabling should be grounded in accordance with local regulations.



#### NOTE

*Proper grounding reduces problems in systems caused by electromagnetic interference.*



## WARNING

Failure to follow adequate grounding procedures can result in electric shock hazard to personnel, or the risk of fire, should a ground fault occur.

All operations described in this section must be performed by properly trained and qualified electricians or technical personnel. If any difficulties are encountered, contact Emerson Network Power. See the back page of this manual for contact information.



## AVERTISSEMENT

Le non-respect des procédures de mise à la terre peut entraîner des risques d'électrocution du personnel, ou des risques d'incendie en cas de défectuosité de la mise à la terre.

Toutes les opérations décrites dans cette section ne doivent être effectuées que par des électriciens ou des techniciens professionnels dûment formés et qualifiés. En cas de difficultés, communiquez avec Emerson Network Power. Pour obtenir les renseignements de contact, consultez la dernière page de ce manuel.

Once the equipment has been positioned and secured, connect the power cables as described below (refer to the appropriate cable connection drawing in **4.0 - Installation Drawings**):

1. Verify that the UPS equipment is isolated from its external power source and all the UPS power isolators are open. Check that these supplies are electrically isolated and post any necessary warning signs to prevent their inadvertent operation.

2. Open exterior and interior panels on the front of the I/O sections.
3. Connect the ground to the equipment ground busbar located in the I/O sections.
4. Make power connections and tighten the connections to the proper torque.

**Ensure correct phase rotation.**



## WARNING

Risk of electrical shock. Can cause injury or death.

If the load equipment will not be ready to accept power on the arrival of the commissioning engineer, ensure that the system output cables are safely isolated at their termination.



## AVERTISSEMENT

Risque de décharge électrique pouvant causer des blessures graves, voire mortelles.

Si les équipements branchés ne sont pas prêts à être alimentés à l'arrivée de l'ingénieur de mise en service, assurez-vous que les bornes des câbles de sortie du système soient isolées de façon sécuritaire.



## WARNING

Risk of electrical shock. Can cause injury or death.

When connecting the cables between the battery extremities to the circuit breaker, always connect the circuit breaker end of the cable first.



## AVERTISSEMENT

Risque de décharge électrique pouvant causer des blessures graves, voire mortelles.

Lors du raccordement de câbles entre des bornes de batterie et un disjoncteur, branchez toujours en premier l'extrémité du câble qui se raccorde au disjoncteur.

5. For control connection details, see **2.4 - Control Cable and Communication**.



## NOTE

*If any fault bracing brackets were removed during installation, they **MUST** be replaced.*

6. Close and secure the interior and exterior doors.
7. Attach the kick plates to the bottom of the unit. See **Figure 20**.

## 2.4 Control Cable and Communication

Based on your site's specific needs, the UPS may require auxiliary connections to manage the battery system (external battery circuit breaker), communicate with a building management system or provide alarm signaling to external devices, or for Remote Emergency Power Off (REPO). The external interface connections, arranged for this purpose, are next to the option box in the Rectifier section (refer to **4.0 - Installation Drawings**).

Figure 2 Liebert eXL customer connections

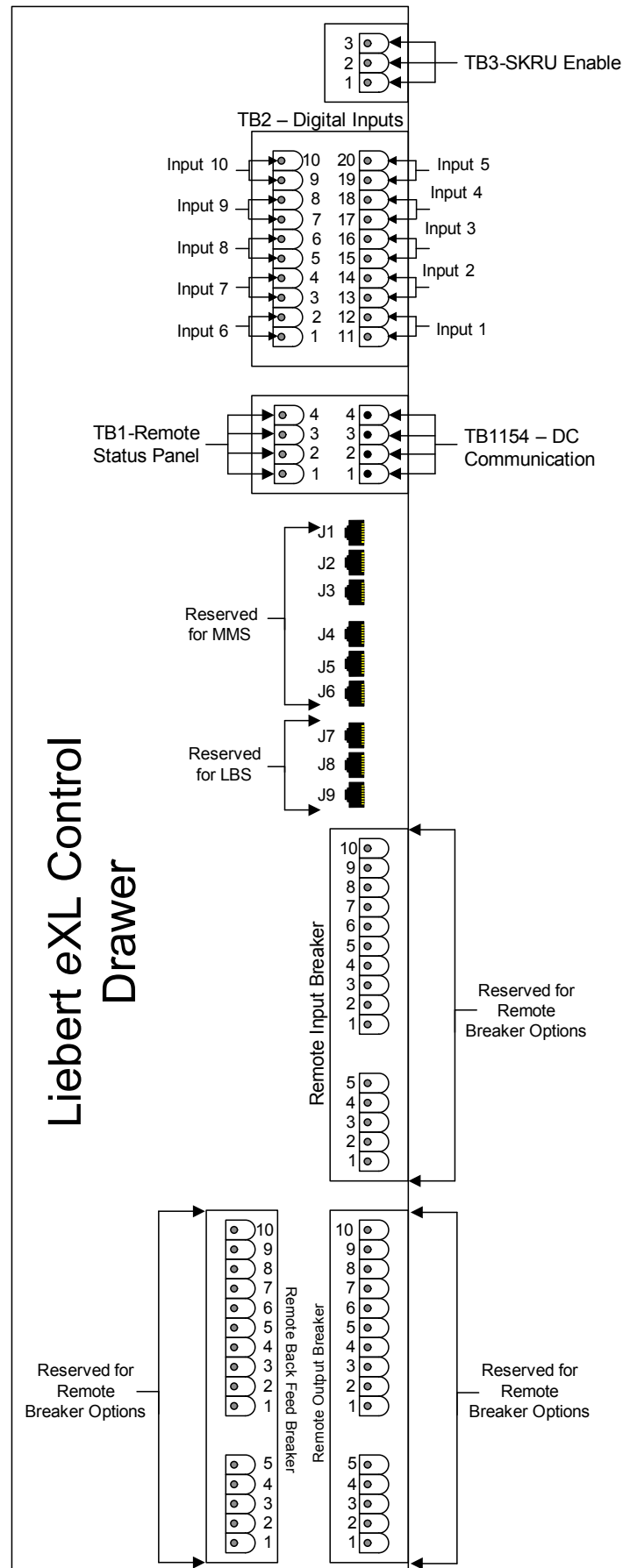
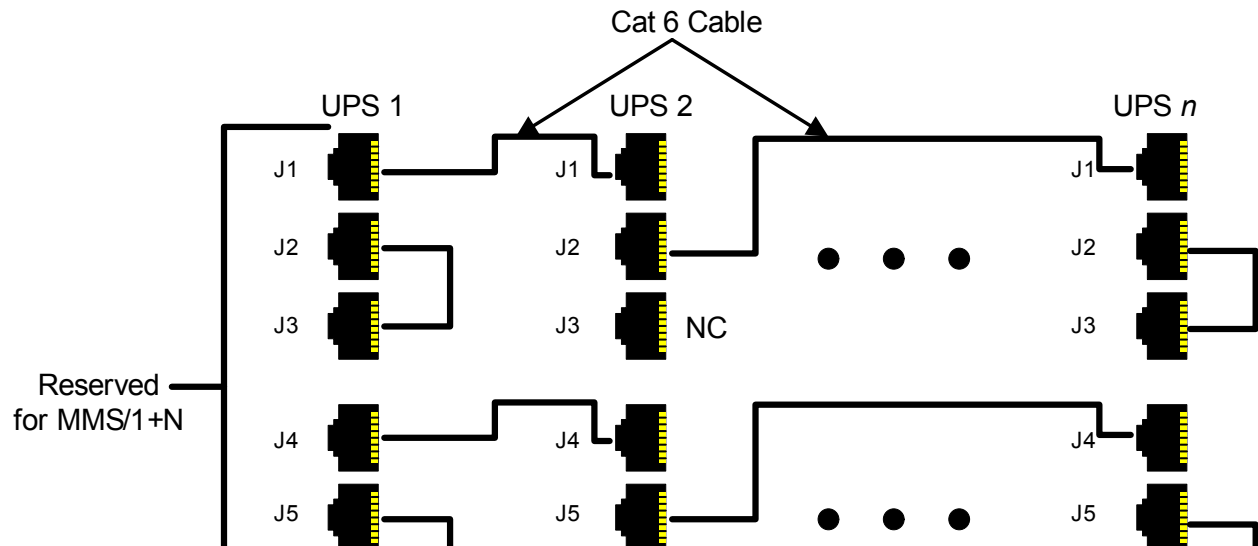


Figure 3 UPS MMS/1+N connectivity





## 2.4.1 Dry Contacts

**Table 1 UPS Digital Inputs**

| Item                                | Terminal Block | Pin | Connects to<br>(Description of External Item) |
|-------------------------------------|----------------|-----|---|
| Maintenance Bypass Breaker (MBB)    | TB2            | 1   | MBB Aux Contact, Closed = CB Is Closed        |
|                                     | TB2            | 2   | MBB Aux Contact Common                        |
| Maintenance Isolation Breaker (MIB) | TB2            | 3   | MIB Aux Contact, Closed = CB is Closed        |
|                                     | TB2            | 4   | MIB Aux Contact Common                        |
| Bypass Isolation Breaker (BIB)      | TB2            | 5   | BIB Aux Contact, Closed = CB is Closed        |
|                                     | TB2            | 6   | BIB Aux Contact Common                        |
| Not Used                            | TB2            | 7   | —   |
|                                     | TB2            | 8   | —   |
| Not Used                            | TB2            | 9   | —   |
| REPO/EPO (N.O.)                     | TB2            | 11  | REPO Switch, Normally Open Contact            |
|                                     | TB2            | 12  | REPO Switch, Normally Open Common             |
| REPO/EPO (Form-C or N.C.)           | TB2            | 13  | REPO Switch, Normally Closed Contact          |
|                                     | TB2            | 14  | REPO Switch, Normally Closed Common           |
| REPO/EPO (Form-C)                   | TB2            | 15  | REPO Switch, Normally Open Contact            |
| Key Status                          | TB2            | 17  | Key Status Switch, Closed = Key Released      |
|                                     | TB2            | 18  | Key Status Switch, Common                     |
| Not Used                            | TB2            | 19  | —   |
|                                     | TB2            | 20  | —   |

1. All contacts have:  
Maximum voltage: 24VDC  
Maximum current: 10mA  
Wire range: #14-22AWG  
Maximum length: 500' (150m)
2. All external wire furnished by others
3. All wiring must be in accordance with national and local electrical codes.
4. If using REPO/EPO with Form-C contacts, Pins 13-15 must be used.
5. If using REPO/EPO with normally closed (N.C.) contacts only, a jumper must be placed across Pins 13 and 14.

**Table 2 UPS Output**

| Item        | Terminal Block | Pin | Connects to<br>(Description of External Item) | Maximum Voltage | Maximum Current | Wire Range | Maximum Length |
|-------------|----------------|-----|---|-----------------|-----------------|------------|----------------|
| SKRU Enable | TB3            | 1   | Maintenance Bypass Cabinet, Common            | 120VAC          | 1A              | #14AWG     | 164ft (50m)    |
|             |                | 2   | Normally Closed (NC)                          |                 |                 |            |                |
|             |                | 3   | Normally Open (NO)                            |                 |                 |            |                |

1. To prevent signal interference, low-voltage (<48V) and low-current (5A) cable groups should be run in separate, grounded conduit from high-voltage or high-current cable groups.
2. All external wire furnished by others.
3. All wiring must be in accordance with national and local electrical codes.

**Table 3 UPS control contacts to Battery Interface Boards**

| Item                          | Terminal Block | Pin | Connects to (Description of External Item) | Maximum Voltage | Maximum Current | Wire Range | Maximum Length |
|-------------------------------|----------------|-----|--|-----------------|-----------------|------------|----------------|
| Battery Cabinet Communication | TB1154         | 1   | CAN +24V                                   | 24VDC           | 2A              | 18AWG      | 1000ft (305m)  |
|                               |                | 2   | CAN Common                                 |                 |                 |            |                |
|                               |                | 3   | CANbus High                                |                 |                 |            |                |
|                               |                | 4   | CANbus Low                                 |                 |                 |            |                |

1. To prevent signal interference, low voltage (<48V) and low current (5A) cable groups should be run in separate grounded conduit from high voltage or high current cable groups.
2. All external wire furnished by others.
3. All wiring must be in accordance with national and local electrical codes.
4. The maximum length must take into account all battery communications connections in the system.

**Table 4 UPS control contacts to Remote Status Panel**

| Item                | Terminal Block | Pin | Connects To (Description of External Item) | Maximum Voltage | Maximum Current | Wire Range | Maximum Length |
|---------------------|----------------|-----|--|-----------------|-----------------|------------|----------------|
| Remote Status Panel | TB1            | 1   | CAN +24V                                   | 24VDC           | 150mA           | 18AWG      | 1000ft (305m)  |
|                     |                | 2   | CAN Common                                 |                 |                 |            |                |
|                     |                | 3   | CANbus High                                |                 |                 |            |                |
|                     |                | 4   | CANbus Low                                 |                 |                 |            |                |

1. To prevent signal interference, low voltage (<48V) and low current (5A) cable groups should be run in separate grounded conduit from high voltage or high current cable groups.
2. All external wire furnished by others.
3. All wiring must be in accordance with national and local electrical codes.

## 2.5 Grounding

### 2.5.1 Three-Wire Input connections

This module must NOT be used when single-phase loads are directly connected to the UPS. Note that whenever the UPS module transfers to or from bypass, two AC sources (UPS output and bypass) are briefly connected together and circulating current must flow. In this configuration, the current flows through the ground path and may trip ground fault interrupters (GFI's), distorting the output voltage waveform. Proper adjustment of GFI's is necessary to avoid unwanted tripping. The time delay should be set to at least 0.2 seconds to prevent tripping when the UPS performs a transfer or retransfer operation.

## NOTICE

Failure to set the ground fault interrupters properly could cause loss of power to the critical load.

### 2.5.2 High Resistance Grounding

Contact your Emerson® representative or the factory to determine whether the Liebert eXL is compatible with the specific type of HRG system involved.

### 2.5.3 Preferred Grounding Configuration, Battery Systems

Open-rack battery systems, depending on local code requirements and customer preference, are normally:

- Floating (ungrounded) OR
- Center-tapped and floating

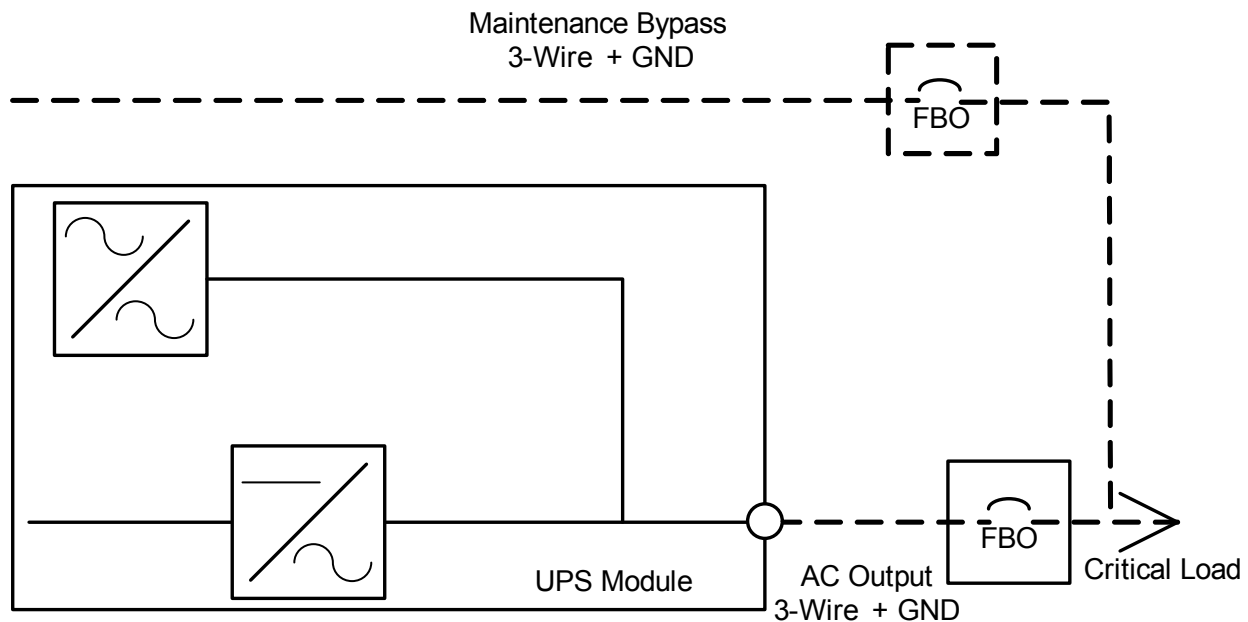
Battery cabinet systems must be connected as floating (ungrounded) systems.

Center-tapped or grounded battery systems are not possible with battery cabinet systems.

Whether the battery system is open-rack or cabinet, the metal rack parts or cabinet must be grounded to the UPS module ground bus.

## 2.6 No CB2 Option

Figure 4 No CB2 option



If a module does not have the inverter output breaker CB2, an overcurrent protection device with a manual disconnect must be supplied by others in a readily accessible location.

This overcurrent protection device must be appropriately sized. See **Table 10** for rated module output current. For system breaker coordination, see **Figures 15** through **17** for the overload capabilities of the modules.



### NOTE

*This option does not allow the Liebert eXL module to be isolated from critical load. Emerson recommends installing a wraparound maintenance bypass. If a wraparound bypass is not installed, according to the latest OSHA safety regulations, the output of the module may need to be shut down to maintain the module.*

## 2.7 Internal Breaker Settings

All internal breakers—CB1, CB2 and BFB—were installed and set at the factory.

### NOTICE

Risk of incorrect adjustment. Can cause equipment damage.

Factory circuit breaker settings must not be altered without contacting Emerson Network Power® customer support.

## 3.0 OPTIONAL EQUIPMENT

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### 3.1 Single-Module System Options

#### 3.1.1 Battery Temperature Sensor

The optional external battery temperature sensor kit, supplied separately from the battery circuit breaker, contains one probe and one temperature transport board.

#### 3.1.2 Matching Liebert eXL Battery Cabinet

The optional matching Liebert eXL Battery Cabinet can be used to obtain the desired autonomy time. The battery cabinets are designed to be either attached to the UPS or separate from the UPS (for details, see the Liebert eXL Battery Cabinet installation manual, SL-26035, available at Emerson Network Power's Liebert Web site: [www.liebert.com](http://www.liebert.com)).

#### 3.1.3 Remote Alarm Status Panel

The remote alarm status panel has LED alarm lights. An audible alarm sounds upon any alarm condition. The surface- or flush-mounted NEMA 1 enclosed panel indicates: Load on UPS, Load on Bypass, Battery Discharging, Low Battery Warning, Overload Warning, Ambient Overtemp Warning, UPS Alarm Condition, New Alarm Condition (For a Second UPS Alarm Condition).

### 3.2 Communication and Monitoring

The Liebert eXL has these monitoring options:

- Liebert IntelliSlot® Unity-DP (Dual Protocol) Card

The Liebert IntelliSlot Unity Card provides Web, embedded Emerson® LIFE™ Technology, Emerson Protocol, SNMP, BACnet IP/MSTP, Modbus TCP/RTU, SMTP, SMS, and telnet communication and control capabilities in one unified communication platform. The platform supports 10/100 Mbit Ethernet, IPv4 and IPv6, HTTP/HTTPS for device Web page access, SMTP interface for e-mail, SMS interface for text messaging, Emerson Protocol for communicating with Trellis™ and Liebert Nform® software applications and LIFE technology for supporting Liebert Remote Service Delivery.

SNMP v1/v2c/v3, Modbus TCP/IP, BACnet IP, Modbus RTU, BACnet MSTP and YDN23 third-party protocols are also supported for building management and network management applications. The Liebert IntelliSlot Unity card provides ground fault isolated 10/100 baseT Ethernet and RS-485 network connectivity.

- Programmable Relay Board
- Input Contact Isolator Board

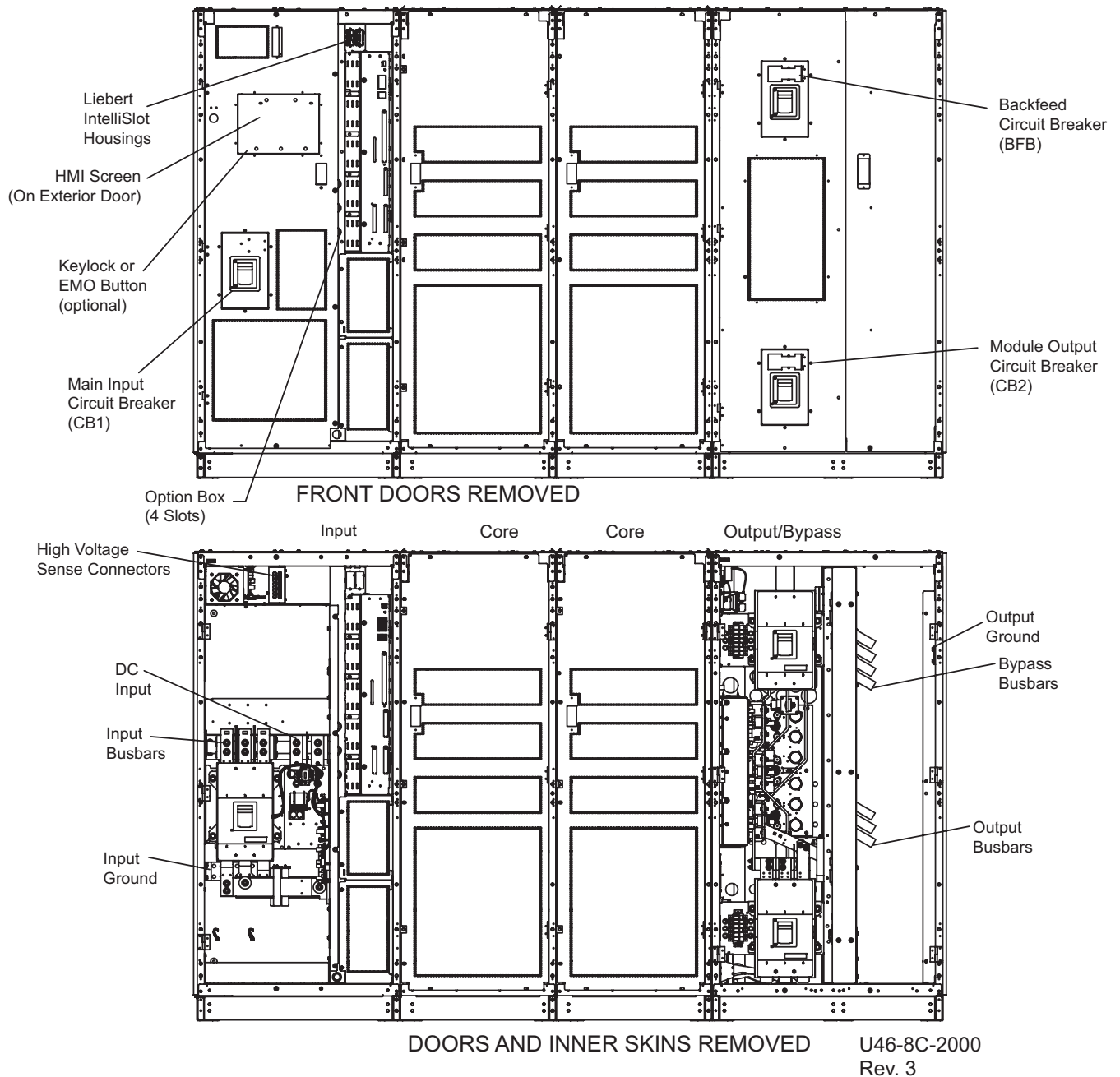
#### 3.2.1 Alber Monitoring System

The matching Liebert eXL Battery Cabinet has space for an Alber battery monitoring system. The battery monitoring system can be factory-installed or field-installed later.

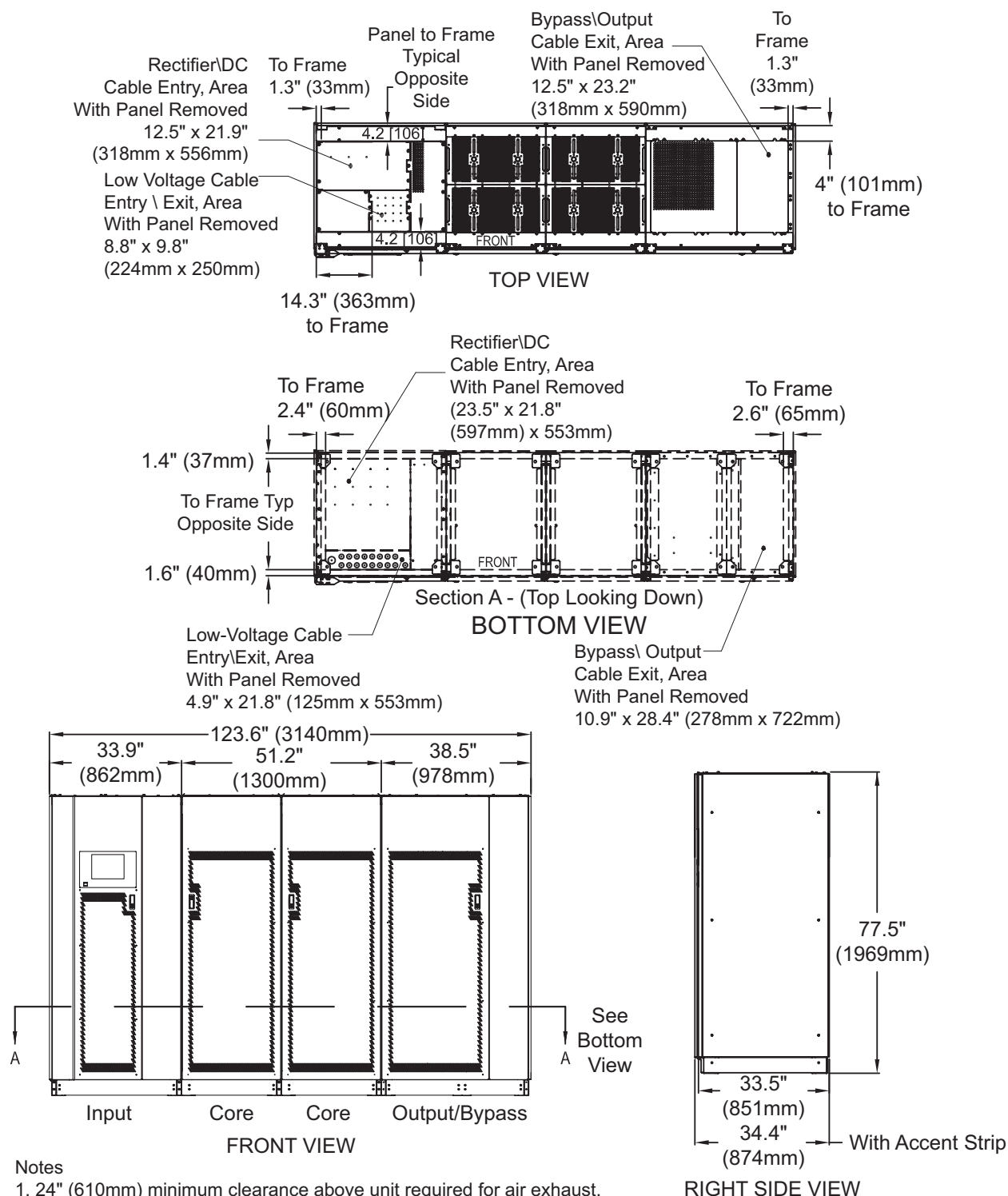
The Alber Battery Monitor by Emerson continuously checks all critical battery parameters, such as cell voltage, overall string voltage, current and temperature. Automatic periodic tests of internal resistance of each battery will verify the battery's operating integrity. Capabilities include automatic internal patented DC resistance tests and trend analysis, providing the ability to analyze performance, aid in troubleshooting and detect failing cells before they fail.

## 4.0 INSTALLATION DRAWINGS

Figure 5 Typical main components, 625-800kVA Liebert eXL single-module UPS



**Figure 6 Outline Drawing, 625-800kVA Liebert eXL single-module UPS**

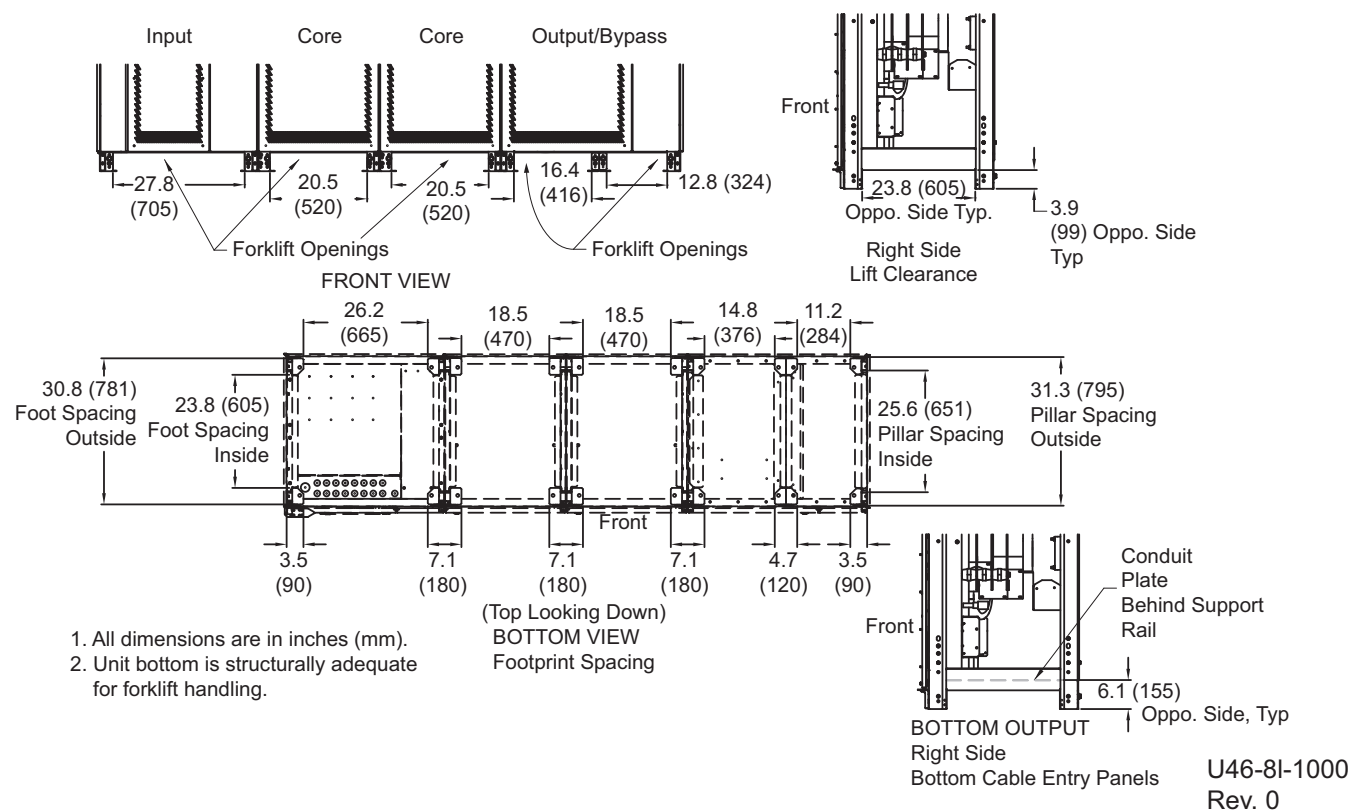


**Notes**

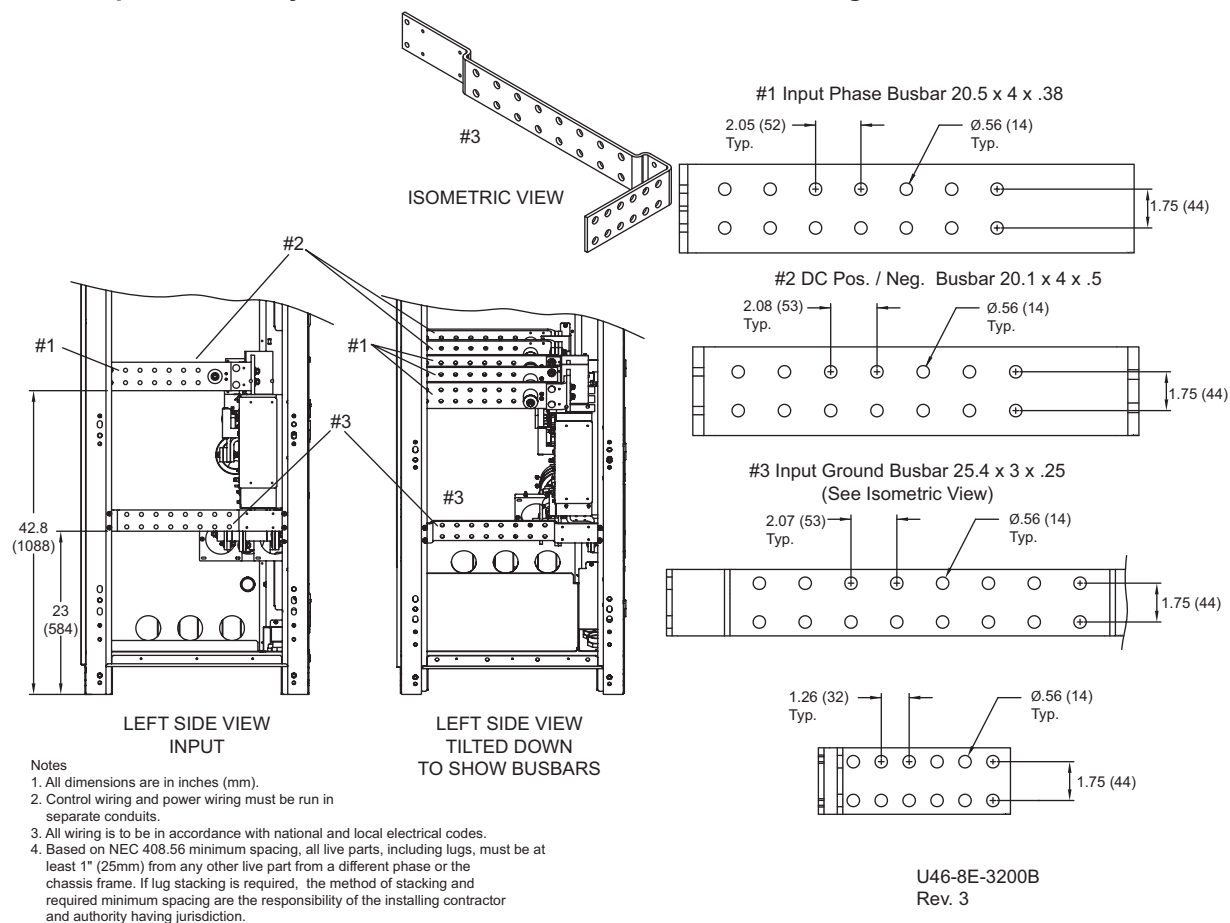
1. 24" (610mm) minimum clearance above unit required for air exhaust, and 36" (914mm) front access required for service.
2. Keep cabinet within 15 degrees of vertical while handling.
3. Top and bottom cable entry available through removable access plates. Remove punch to suit conduit size and replace.
4. Unit bottom is structurally adequate for forklift handling.
5. Control wiring and power wiring must be run in separate conduits.
6. All wiring is to be in accordance with national and local electrical codes.
7. Width dimension includes side panels. Subtract 1.4" (35mm) when removing both side panels.
8. See technical information drawing for shipping split weights.

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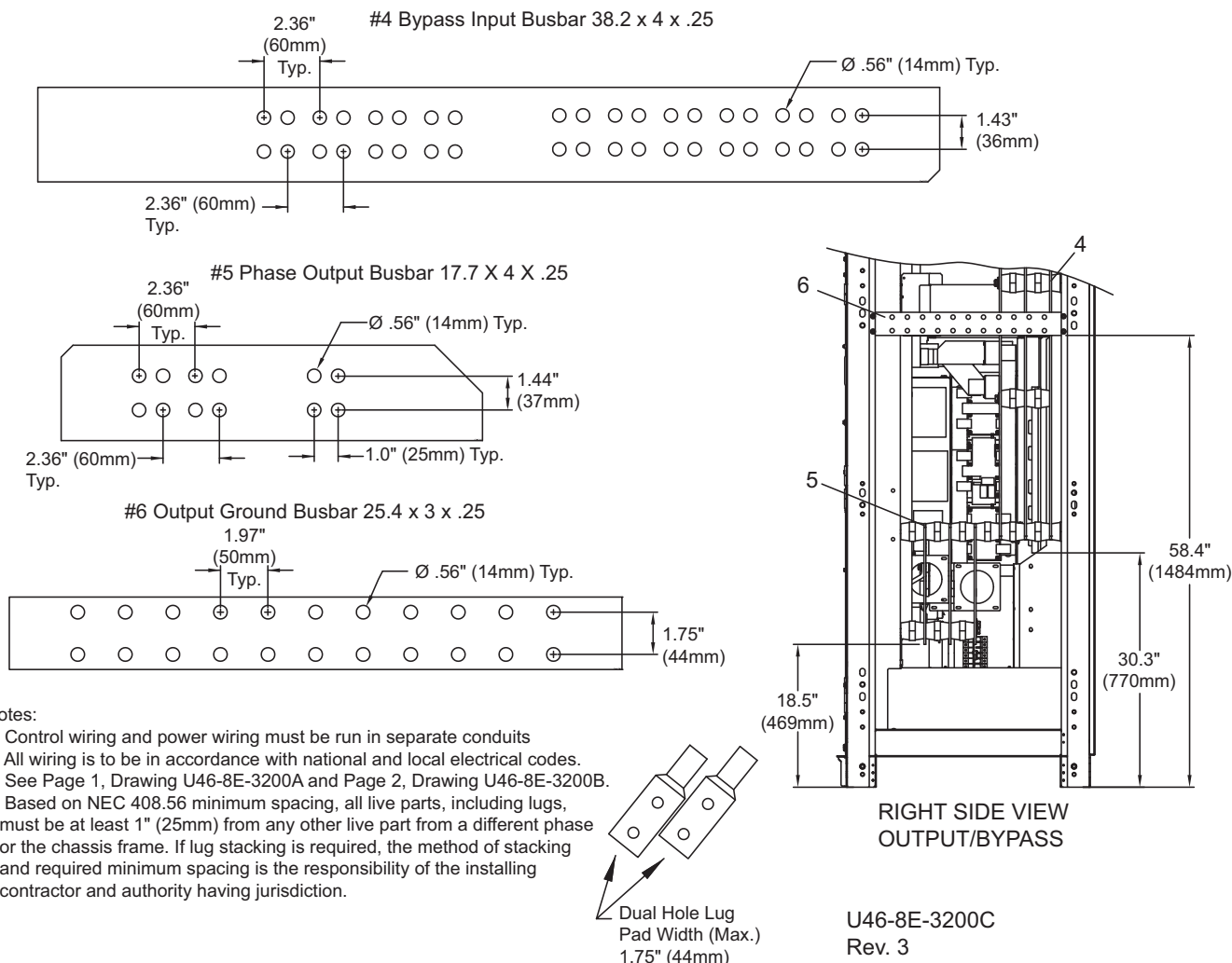
**Figure 7 Base drawing, 625-800kVA Liebert eXL single-module UPS**



**Figure 8 Input and battery terminal detail, 625-800kVA Liebert eXL single-module UPS**



**Figure 9 Output and bypass terminal detail, 625-800kVA Liebert eXL single-module UPS**



**Figure 10 Input, output and bypass terminal spacing details, 625-800kVA Liebert eXL single-module UPS**

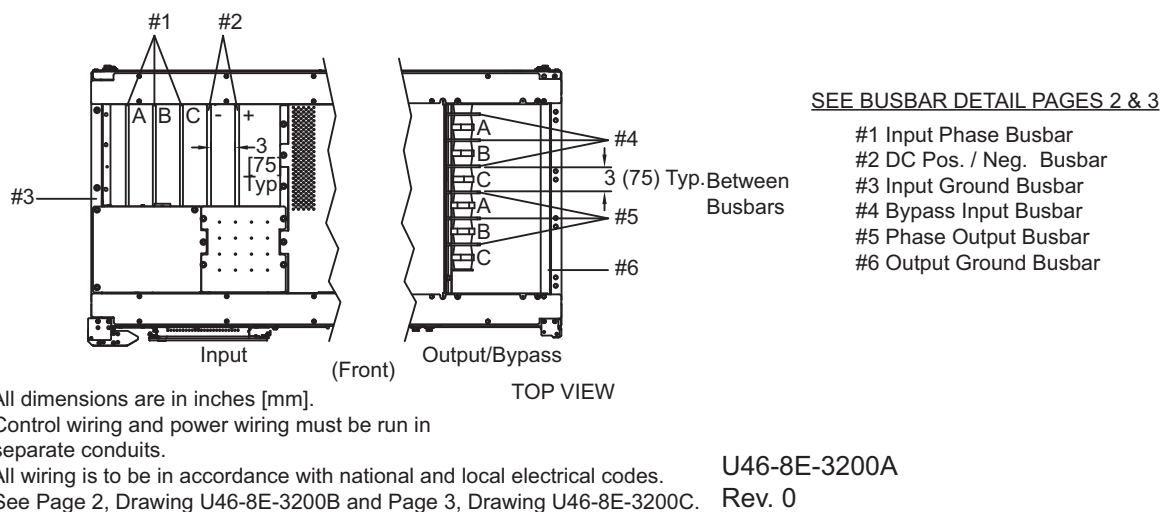
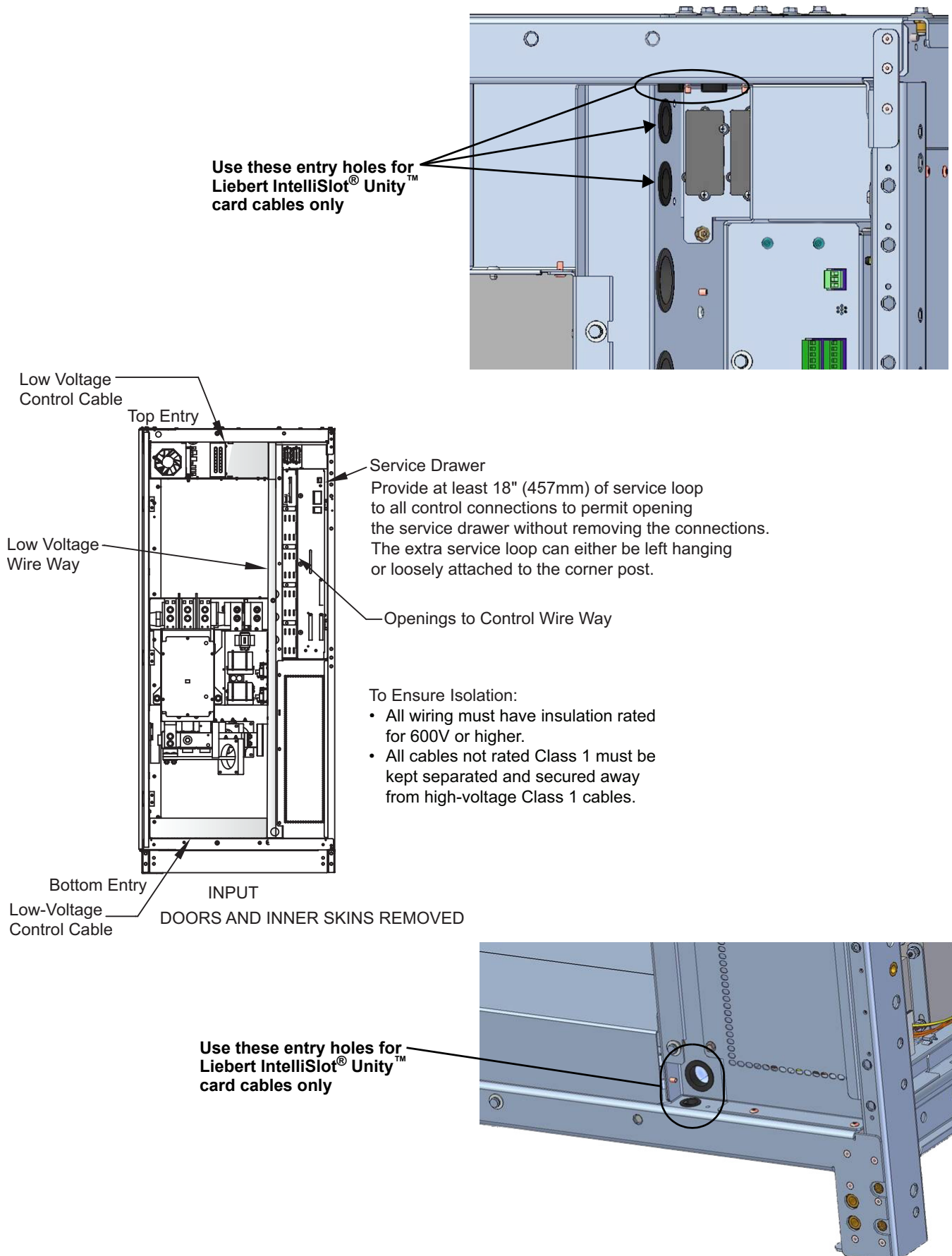
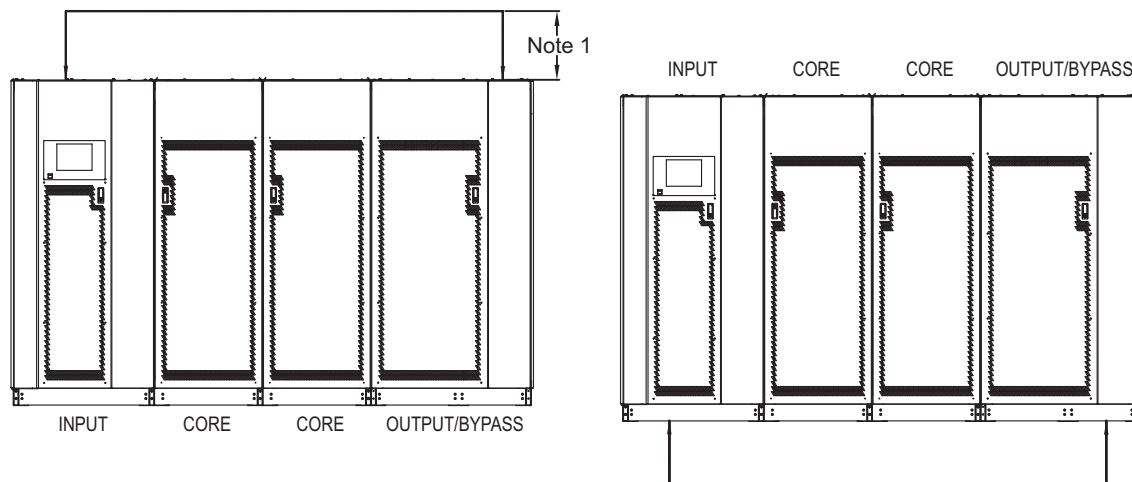




Figure 11 Low-voltage cable routing



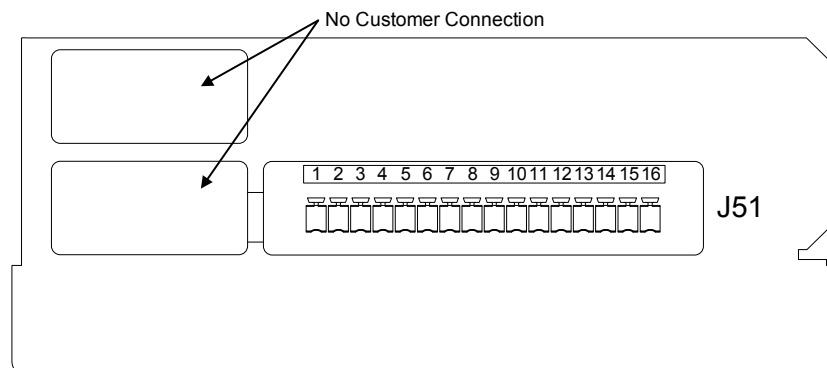
**Figure 12 Cabling for single input configuration**



**NOTES**

1. 24" (610) minimum clearance above unit required for air exhaust.
2. Top and bottom cable entry available through removable access plates. Remove punch to suit conduit size and replace.
3. All wiring is to be in accordance with national and local electrical codes.
4. See **Table 12** for cable sizing
5. Connection between the rectifier and bypass busbars are supplied by others.
6. Based on NEC 408.56 minimum spacing, all live parts, including lugs, must be at least 1 inch (25.4mm) from any other live part from a different phase or the chassis frame. If lug stacking is required, the method of stacking and required minimum spacing is the responsibility of the installing contractor and authority having jurisdiction. See **Figures 8- 10** for busbar details.

**Figure 13 Optional Input Contact Isolator Board**



1. Customer control wiring connection points are terminals 1 through 16 (see **Table 5**).
2. Customer provided normally open dry contacts for user alarm messages.
3. All control wiring (by others) must be run separate from power wiring.
4. Signal voltage: 100mA @ 12VDC.
5. Maximum cable length 500 ft. (152m) with #16AWG and flexible stranded cable.
6. All wiring must be in accordance with national and local electrical codes.

**Table 5 Input Contact Isolator Board control wiring connections**

| Input Contact | Pin No. |
|---------------|---------|
| 1             | 1       |
|               | 2       |
| 2             | 3       |
|               | 4       |
| 3             | 5       |
|               | 6       |
| 4             | 7       |
|               | 8       |
| 5             | 9       |
|               | 10      |
| 6             | 11      |
|               | 12      |
| 7             | 13      |
|               | 14      |
| 8             | 15      |
|               | 16      |

**Figure 14 Control wiring, Programmable Relay Board**

1. Customer control wiring connection points are terminals 1 through 15. (Pin 16 not used on J71, J72, and J73.)
2. Programmable Relay Board option includes eight signal channels with two Form-C dry contacts per channel (see **Table 6**).
3. All control wiring (by others) must be run separate from power wiring.
4. Contact ratings: 1A @ 30VDC or 125VAC @ 0.45A
5. Maximum cable length 500 ft. (152m) with #16AWG and flexible stranded cable.
6. All wiring must be in accordance with national and local electrical codes.

**Table 6 Programmable Relay Board pinout**

| Terminal Block | Channel | Pin No. | Common | Normally Closed | Normally Open |
|----------------|---------|---------|--------|-----------------|---------------|
| J71            | CH1     | A 1-3   | 1      | 2               | 3             |
|                |         | B 4-6   | 4      | 5               | 6             |
|                | CH2     | A 7-9   | 7      | 8               | 9             |
|                |         | B 10-12 | 10     | 11              | 12            |
|                | CH3     | A 13-15 | 13     | 14              | 15            |
|                |         | B 1-3   | 1      | 2               | 3             |
| J72            | CH4     | A 4-6   | 4      | 5               | 6             |
|                |         | B 7-9   | 7      | 8               | 9             |
|                | CH5     | A 10-12 | 10     | 11              | 12            |
|                |         | B 13-15 | 13     | 14              | 15            |
|                | CH6     | A 1-3   | 1      | 2               | 3             |
|                |         | B 4-6   | 4      | 5               | 6             |
| J73            | CH7     | A 7-9   | 7      | 8               | 9             |
|                |         | B 10-12 | 10     | 11              | 12            |
|                | CH8     | A 13-15 | 13     | 14              | 15            |
|                |         | B 1-3   | 1      | 2               | 3             |
| J74            | CH8     | A 1-3   | 1      | 2               | 3             |
|                |         | B 1-3   | 1      | 2               | 3             |

Note: Pin 16 not used on J71, J72, and J73.

## 5.0 SPECIFICATIONS

**Table 7 Liebert eXL UPS specifications**

| Model Size  | 625-800kVA   |
|---|--|
| <b>Input Parameters</b>   |  |
| Input Voltage to Rectifier, VAC   | 480V 3-phase, 3-wire   |
| Input Voltage to Bypass, VAC  | 480V 3-phase, 3-wire   |
| Input Voltage Range, VAC  | +10% to -30%   |
| Input Frequency, Hz   | 60   |
| Permissible Input Frequency Range, Hz   | 55 to 65   |
| Reflected Input THDi, Nominal Voltage, Full Load, %                                 | <5%  |
| Power Walk-In, sec  | 1 to 30 (selectable) in 1 sec. Increment   |
| <b>Battery &amp; DC Parameters</b>  |  |
| Battery Type  | VRLA (Valve Regulated Lead Acid) or FLA (Flooded Lead Acid)                          |
| Nominal Battery Bus, VDC  | 480V   |
| Battery Float Voltage, VDC  | 540V   |
| Minimum End of Discharge Voltage, VDC   | 384V (for VRLA / Flooded Lead Acid)  |
| DC Ripple Voltage in Float & Const V Ch. Mode, %                                    | <1 (RMS value) < 3,4% V <sub>pp</sub>  |
| Temperature Compensated Battery Charging  | Optional (with temperature probe)  |
| <b>Output Parameters</b>  |  |
| Inverter Type   | IGBT-based Sine Wave PWM Controlled  |
| Output Power, kW  | 625   750   800  |
| Output Voltage, VAC   | 480V 3-ph, 3-wire  |
| Output Voltage Regulation, %  | < 1% (3-phase RMS average)   |
| Output Voltage Regulation (50% Unbalanced Load)                                     | < 2% (3-phase RMS average)   |
| Output Frequency, Hz  | 60   |
| Output Frequency Regulation, %  | ± 0.1  |
| Output THDv Linear Load at Nominal Voltage, %                                       | <3%  |
| Output THDv at Nominal Voltage Including a 100kVA Non-Linear Load per EN 62040-3, % | 6% (max)   |
| Capacity to Handle High Crest Factor Load   | 3:1  |
| Capacity to handle Step Load, %   | 0-100 or 100-0   |
| Step Load Transient Recovery (linear loads), %                                      | IEC 62040-3, Section 5.3.1 Figure 1  |
| Unbalance Loads Current Capacity  | 100% of nominal phase current  |
| Load Power Factor Supported (Without Derating)                                      | 0.7 Leading to 0.7 Lagging   |
| Voltage Displacement, ° (Electrical Degree)   | 120° ±1° (with 50% unbalanced load)  |
| Overload Conditions, % FL   | See <b>Figures 15, 16 and 17</b>   |
| <b>Physical Parameters and Standards</b>  |  |
| Width, in (mm), With Static Bypass  | 123.6 (3140)   |
| Depth, in (mm)  | 34.4 (874)   |
| Height, in (mm)   | 77.5 (1969)  |
| Weight, Unpackaged, lb. (kg) approximate with Static Bypass (SMS)                   | 5187 (2353)  |
| Maximum Heat Dissipation, Full Load, BTU/hr (kW)                                    | 625kVA UPS: 77,348 (22.7)<br>750kVA UPS: 92,817 (27.2)<br>800kVA UPS: 101,940 (29.9) |
| Cooling Air, CFM  | <4,800   |
| Color   | Black (ZP-7021)  |
| Front Door Opening (for serviceability)   | 90°  |
| Degree of Protection for UPS Enclosure  | IP 20 (with and without front door open)   |
| Minimum Clearance, Top, in (mm)   | 24 (610)   |
| Minimum Clearance, Back, in (mm)  | 0  |

**Table 7** Liebert eXL UPS specifications (*continued*)

| Model Size                           | 625-800kVA  |
|--------------------------------------|---|
| Minimum Clearance, Sides, in (mm)    | 0   |
| Location of Cable Entrance           | Top or Bottom   |
| Standards and Conformities           | UL 1778, 4th Ed.<br>CSA 22.2 107.3<br>FCC Part 15, Class A (with optional filters installed)<br>IEC62040-2, Level 4, Criteria A<br>ANSI C62.41, Category A3 &B3<br>ISTA<br>WEEE |
| Environmental Parameters             |   |
| Storage Temperature Range, °F (°C)   | -13 to 158 (-25 to 70)  |
| Operating Temperature Range, °F (°C) | 32°F to 95°F (0°C to 35°C) at full rated load<br>1.5% maximum kW / degrees C derating up to 50°C<br>122°F (50°C) absolute maximum with derating                                 |
| Relative Humidity                    | 95% or less Non-Condensing<br>(Operating and Non-Operating)   |
| Maximum Altitude Above MSL           | 3300 ft.(1000m) (per IEC 62040/3) - 1% Maximum kW<br>derating / 1000 ft. rise between 3300 and 10,000 ft.(305m<br>rise between 1000 and 3000m)                                  |

Width dimensions are with side panels attached. Subtract 1.4" (35mm) for dimensions without side panels.

Depth dimensions include the front door and rear panel.

**Table 8** Current ratings—rectifier input

| UPS Rating |     | Voltage<br>VAC | Nominal<br>Current | Maximum<br>Current |
|------------|-----|----------------|--------------------|--------------------|
| kVA        | kW  |                |                    |                    |
| 625        | 625 | 480            | 779                | 818                |
| 750        | 750 | 480            | 935                | 982                |
| 800        | 800 | 480            | 995                | 1044               |

**Table 9** Current ratings—bypass input

| UPS Rating |     | Voltage<br>VAC | Nominal<br>Current |
|------------|-----|----------------|--------------------|
| kVA        | kW  |                |                    |
| 625        | 625 | 480            | 752                |
| 750        | 750 | 480            | 902                |
| 800        | 800 | 480            | 962                |

**Table 10** Current ratings—output

| UPS Rating |     | Voltage<br>VAC | Nominal<br>Current |
|------------|-----|----------------|--------------------|
| kVA        | kW  |                |                    |
| 625        | 625 | 480            | 752                |
| 750        | 750 | 480            | 902                |
| 800        | 800 | 480            | 962                |

**Table 11** Current ratings—DC source

| UPS Rating |     | Voltage<br>VAC | Nominal<br>Current |
|------------|-----|----------------|--------------------|
| kVA        | kW  |                |                    |
| 625        | 625 | 480            | 1624               |
| 750        | 750 | 480            | 1949               |
| 800        | 800 | 480            | 2079               |

**Notes on Tables**

1. Nominal rectifier AC input current (considered continuous) is based on full rated output load. Maximum current includes nominal input current and maximum battery recharge current (considered non-continuous).
2. The rectifier overload current is controlled by the input current limit setting, which is adjustable from 25 to 200% (default:125%).
3. For breaker coordination while the module is overloaded, see the current versus time values on the overload curves.
4. Nominal battery voltage is shown at 2.0 volts/cell.
5. DC Source current based at 401VDC.

Figure 15 Inverter overload data

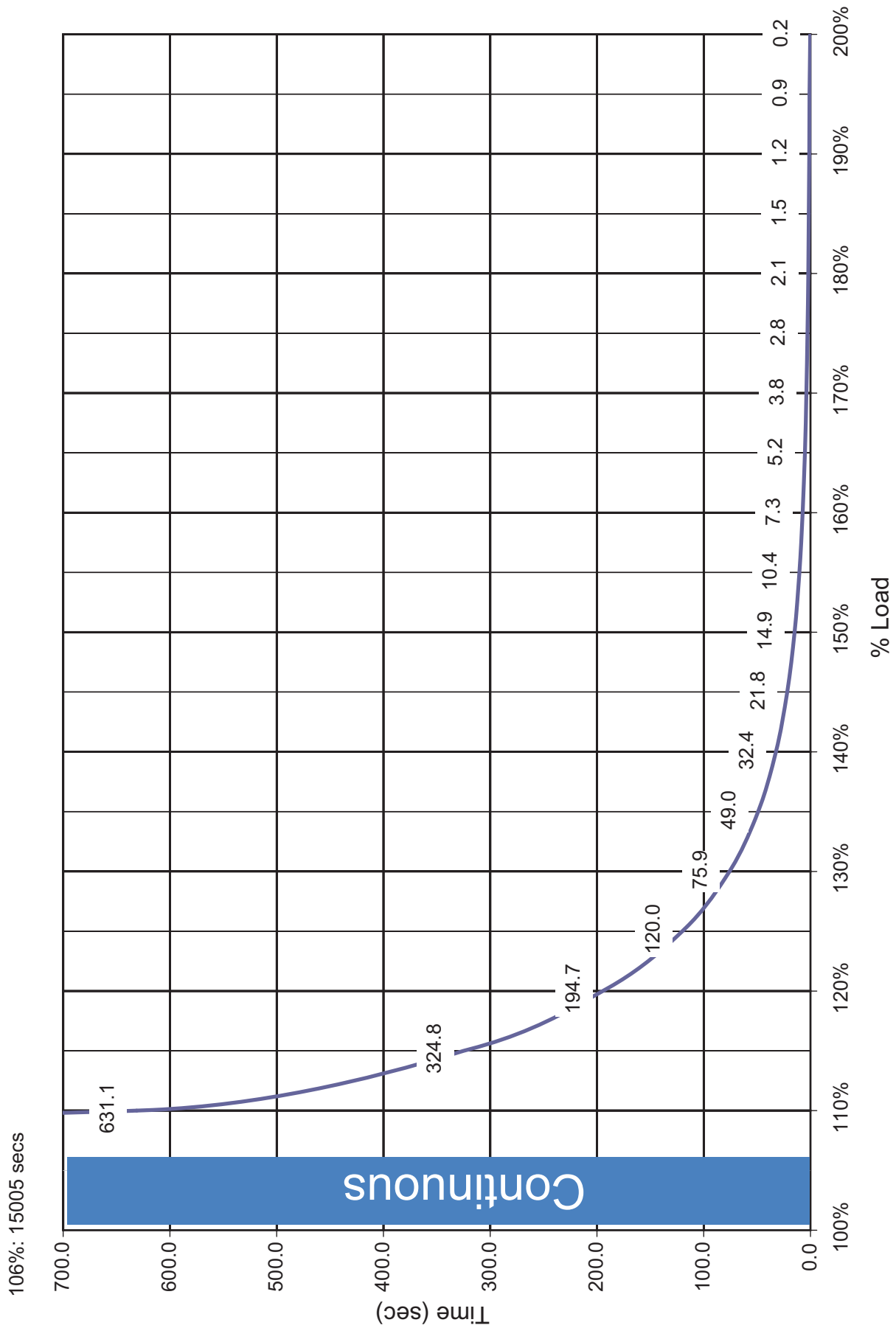


Figure 16 Rectifier overload data

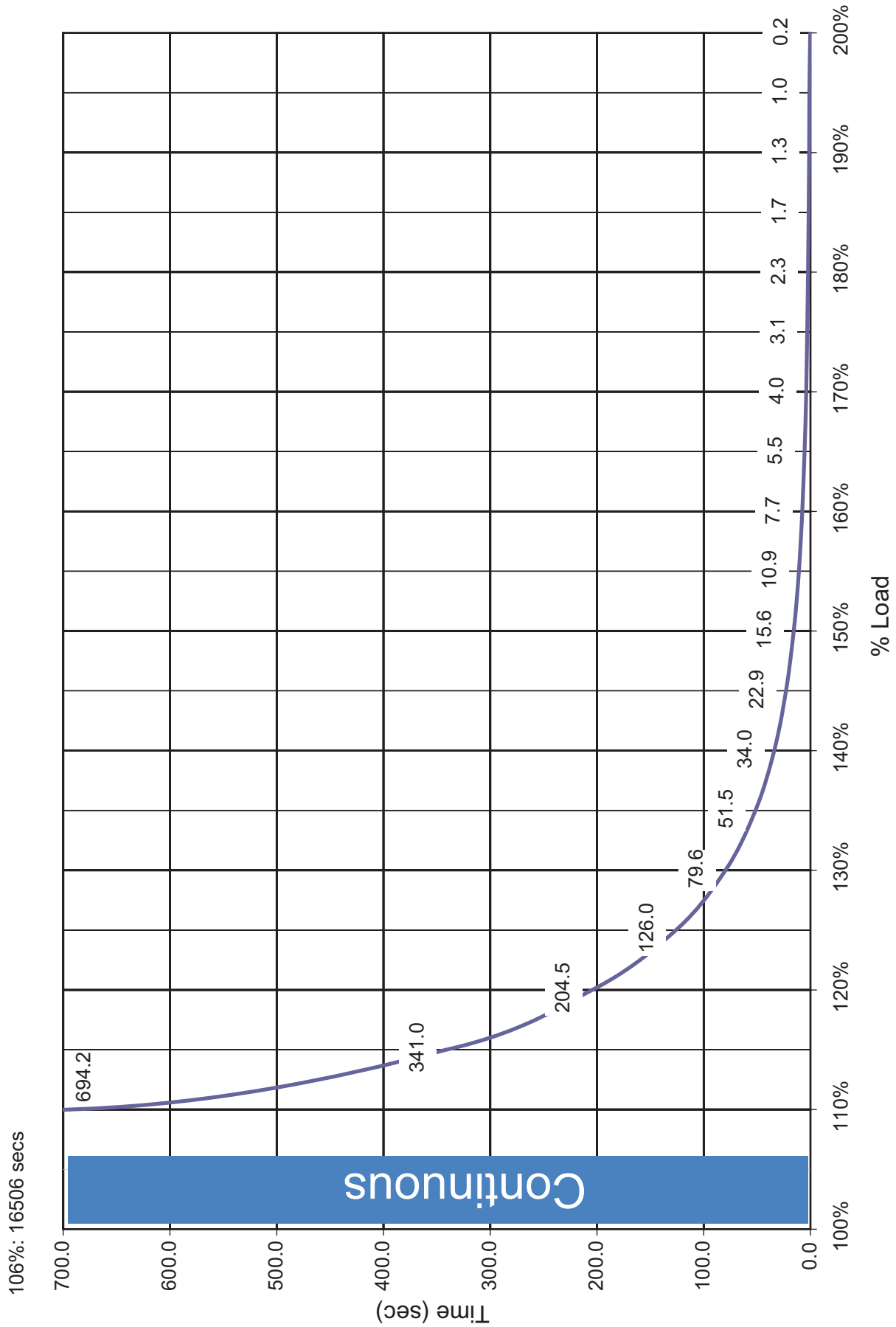
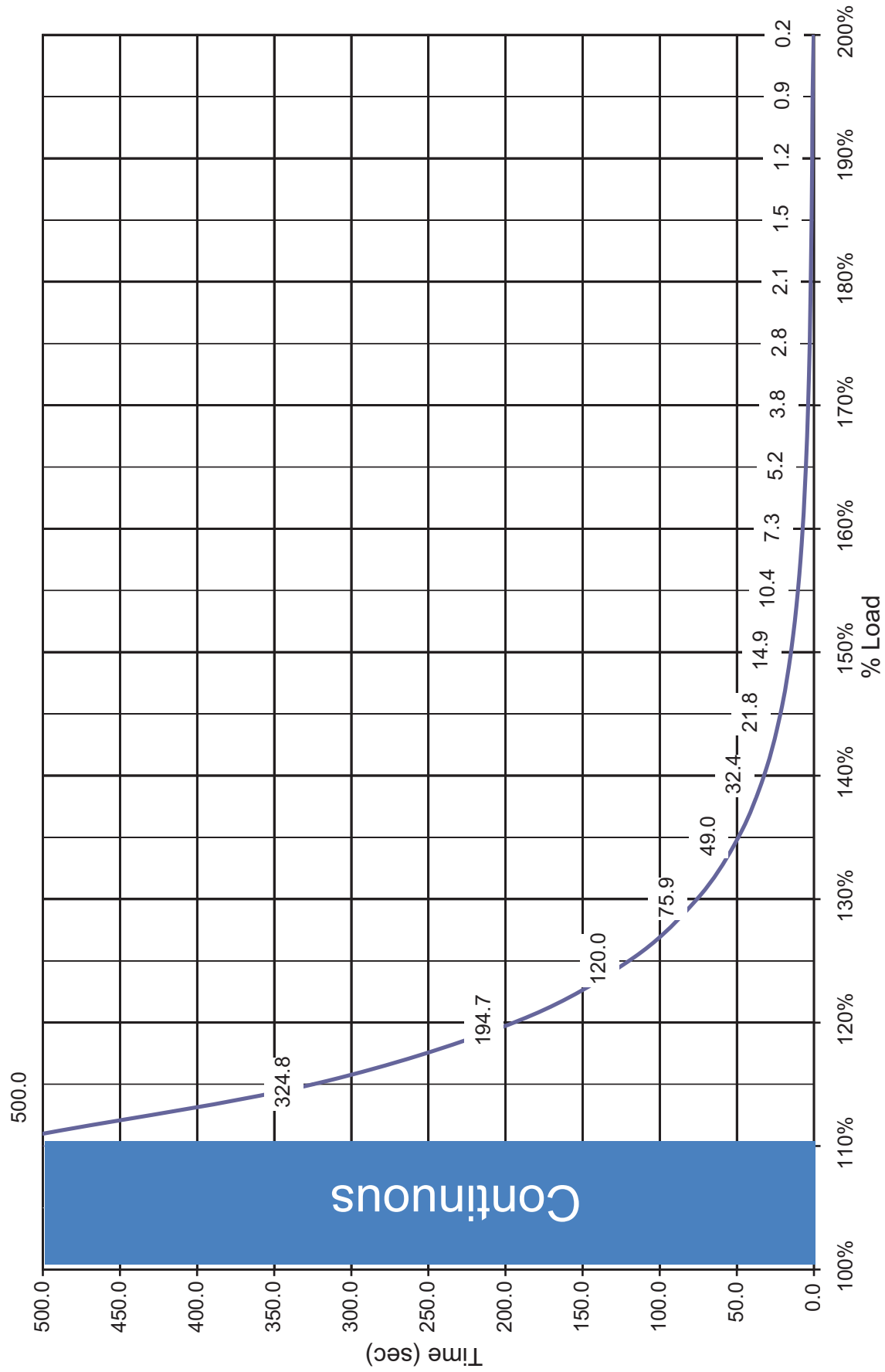


Figure 17 Bypass overload data





**Table 12 Recommended conduit and cable sizes for use with 100% rated breakers**

| Rectifier Input |     |             |             |   |                                |
|-----------------|-----|-------------|-------------|---|--------------------------------|
| UPS Rating      |     | Voltage VAC | Cable Entry | (# of conduits); size of conduits; # -size of phase cables per conduit; size of cable for ground per conduit  |                                |
| kVA             | kW  |             |             | Copper Conductors   | Aluminum Conductors            |
| 625             | 625 | 480         | Top         | (3) 2.5"C 3-350kcmil; #2/0AWG   | (3) 3"C 3-500kcmil; #4/0AWG    |
|                 |     |             | Bottom      | (3) 3"C 3-350kcmil; #2/0AWG   | (3) 3.5"C 3-500kcmil; #4/0AWG  |
| 750             | 750 |             | Top         | (3) 3"C 3-500kcmil; #2/0AWG   | (3) 3"C 3-600kcmil; #4/0AWG    |
|                 |     |             | Bottom      | (3) 3.5"C 3-500kcmil; #2/0AWG   | (3) 3.5"C 3-600kcmil; #4/0AWG  |
| 800             | 800 |             | Top         | (4) 2.5"C 3-350kcmil; #3/0AWG   | (4) 3"C 3-500kcmil; 250kcmil   |
|                 |     |             | Bottom      | (4) 3"C 3-350kcmil; #3/0AWG   | (4) 3.5"C 3-500kcmil; 250kcmil |
| Bypass Input    |     |             |             |   |                                |
| UPS Rating      |     | Voltage VAC | Cable Entry | (# of conduits); size of conduits; # - size of phase cables per conduit; size of cable for ground per conduit |                                |
| kVA             | kW  |             |             | Copper Conductors   | Aluminum Conductors            |
| 625             | 625 | 480         | Top         | (3) 2.5"C 3-350kcmil; #1/0AWG   | (3) 3"C 3-500kcmil; #3/0AWG    |
|                 |     |             | Bottom      | (3) 3"C 3-350kcmil; #1/0AWG   | (3) 3.5"C 3-500kcmil; #3/0AWG  |
| 750             | 750 |             | Top         | (3) 3"C 3-500kcmil; #2/0AWG   | (3) 3"C 3-600kcmil; #4/0AWG    |
|                 |     |             | Bottom      | (3) 3.5"C 3-500kcmil; #2/0AWG   | (3) 3.5"C 3-600kcmil; #4/0AWG  |
| 800             | 800 |             | Top         | (3) 3"C 3-500kcmil; #2/0AWG   | (3) 3"C 3-600kcmil; #4/0AWG    |
|                 |     |             | Bottom      | (3) 3.5"C 3-500kcmil; #2/0AWG   | (3) 3.5"C 3-600kcmil; #4/0AWG  |
| Output          |     |             |             |   |                                |
| UPS Rating      |     | Voltage VAC | Cable Entry | (# of conduits); size of conduits; # -size of phase cables per conduit; size of cable for ground per conduit  |                                |
| kVA             | kW  |             |             | Copper Conductors   | Aluminum Conductors            |
| 625             | 625 | 480         | Top         | (3) 2.5"C 3-350kcmil; #1/0AWG   | (3) 3"C 3-500kcmil; #3/0AWG    |
|                 |     |             | Bottom      | (3) 3"C 3-350kcmil; #1/0AWG   | (3) 3.5"C 3-500kcmil; #3/0AWG  |
| 750             | 750 |             | Top         | (3) 3"C 3-500kcmil; #2/0AWG   | (3) 3"C 3-600kcmil; #4/0AWG    |
|                 |     |             | Bottom      | (3) 3.5"C 3-500kcmil; #2/0AWG   | (3) 3.5"C 3-600kcmil; #4/0AWG  |
| 800             | 800 |             | Top         | (3) 3"C 3-500kcmil; #2/0AWG   | (3) 3"C 3-600kcmil; #4/0AWG    |
|                 |     |             | Bottom      | (3) 3.5"C 3-500kcmil; #2/0AWG   | (3) 3.5"C 3-600kcmil; #4/0AWG  |
| Battery         |     |             |             |   |                                |
| UPS Rating      |     | Voltage VAC | Cable Entry | (# of conduits); size of conduits; # -size of phase cables per conduit; size of cable for ground per conduit  |                                |
| kVA             | kW  |             |             | Copper Conductors   | Aluminum Conductors            |
| 625             | 625 | 480         | Top         | (5) 3"C 3-600kcmil; 250kcmil  | (6) 3"C 3-600kcmil; 400kcmil   |
|                 |     |             | Bottom      | (5) 3"C 3-600kcmil; 250kcmil  | (6) 3.5"C 3-600kcmil; 400kcmil |
| 750             | 750 |             | Top         | (5) 3"C 3-600kcmil; 250kcmil  | (6) 3"C 3-600kcmil; 400kcmil   |
|                 |     |             | Bottom      | (5) 3"C 3-600kcmil; 250kcmil  | (6) 3.5"C 3-600kcmil; 400kcmil |
| 800             | 800 |             | Top         | (6) 3"C 3-600kcmil; 350kcmil  | (7) 3"C 3-700kcmil; 600kcmil   |
|                 |     |             | Bottom      | (6) 3"C 3-600kcmil; 350kcmil  | (7) 3.5"C 3-700kcmil; 600kcmil |

1. Recommended cable sizes are 167°F (75°C) (THW) wire at 86°F (30°C) ambient. Unless otherwise noted, use copper or aluminum conductors suitable for at least 75°C.
2. Recommended cables and conduits are based on breaker trip setting sized for the maximum continuous rated current for the rectifier input and the nominal current for the bypass and output listed in **Tables 8** through **11**.
3. Conduit size is based on RNC type conduit for bottom input and EMT-type conduit for top input.
4. Emerson recommends that the site planner choose the appropriate cable type based on the particular installation requirements.

**Table 13 Recommended lug sizes**

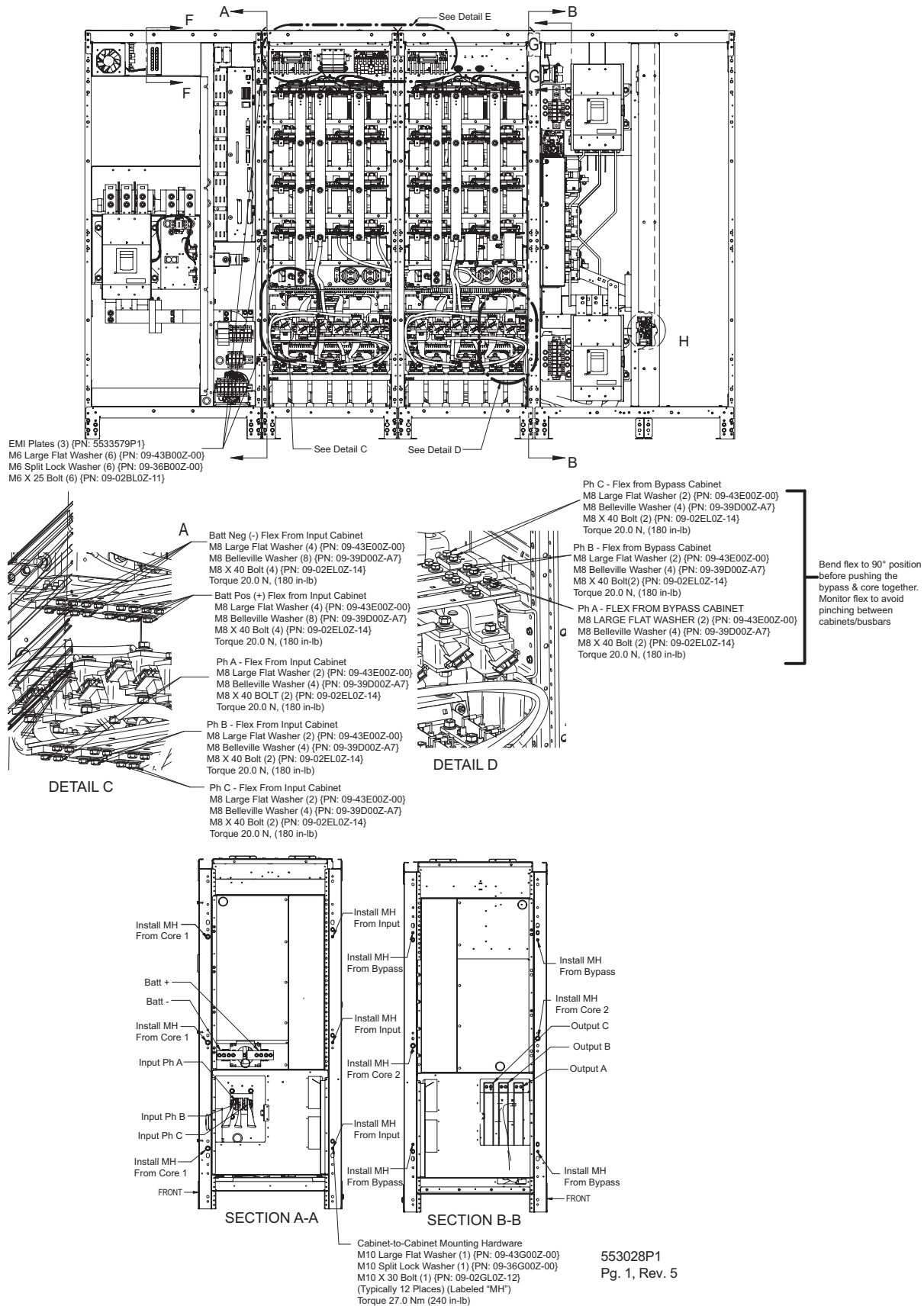
| Cable Size | T&B Copper One Hole | T&B Copper Two Hole | T&B Aluminum One Hole | T&B Aluminum Two Hole |
|------------|---------------------|---------------------|-----------------------|-----------------------|
| #8AWG      | 54930BE             | 54850BE             | 60104-TB              | —                     |
| #6AWG      | 54905BE             | 256-30695-868       | 60109-TB              | —                     |
| #4AWG      | 54906BE             | 256-30695-733       | 60114-TB              | —                     |
| #2-3AWG    | 54942BE             | 54811BE             | 60120                 | —                     |
| #1AWG      | 54947BE             | 54857BE             | 60126                 | —                     |
| #1/0AWG    | 54950BE             | 256-30695-593       | 60132                 | —                     |
| #2/0AWG    | 54951BE             | 54862BE             | 60138                 | 60238                 |
| #3/0AWG    | 54965BE             | 54864BE             | 60144                 | 60244                 |
| #4/0AWG    | 54970BE             | 54866BE             | 60150                 | 60250                 |
| 250kcmil   | 54913BE             | 54868BE             | 60156                 | 60256                 |
| 300kcmil   | 54914BE             | 54870BE             | 60162                 | 60262                 |
| 350kcmil   | 54915BE             | 54872BE             | 60165                 | 60267                 |
| 400kcmil   | 54916BE             | 54874BE             | 60168                 | 60269                 |
| 500kcmil   | 54918BE             | 54876BE             | 60171                 | 60273                 |
| 600kcmil   | 54920BE             | 54878BE             | 60176                 | 60275                 |
| 750kcmil   | 54922BE             | 54880BE             | 60178                 | 60277 (750kcmil)      |

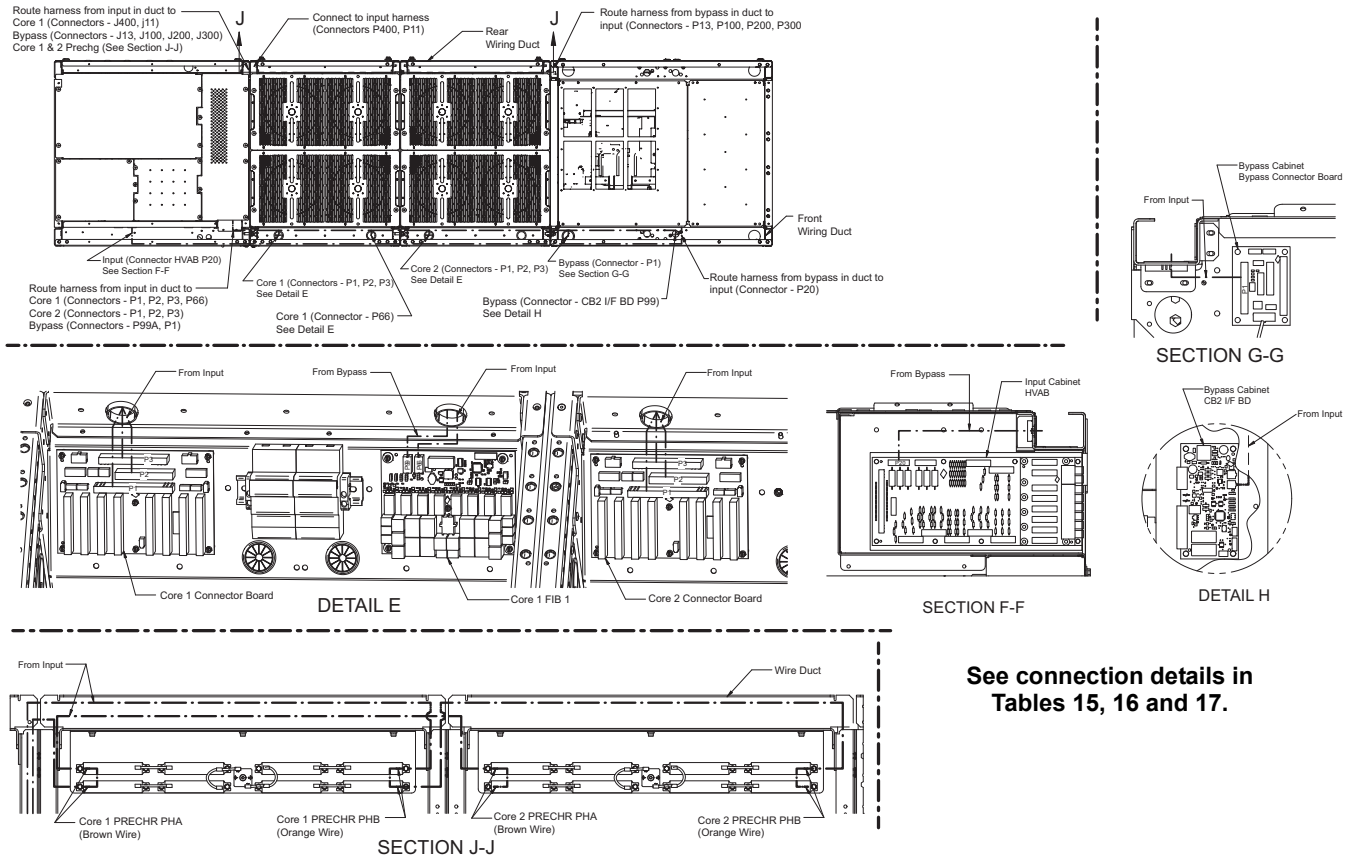
**Table 14 Recommended torque values**

| Grade 5 Steel: Unified Thread System Torque, lbf.*in. |                                   |                           |                           | Class 8.8 Steel: Metric Thread System Torque, N*m |                                 |                           |                           |
|---|-----------------------------------|---------------------------|---------------------------|---|---------------------------------|---------------------------|---------------------------|
| Fastener Finish ⇒                                     |                                   | Plain Steel               | Zinc Plating              | Fastener Finish ⇒                                 |                                 | Plain Steel               | Zinc Plating              |
| Size  | Threads/<br>Inch, T <sub>pi</sub> | No Washer/<br>Flat Washer | No Washer/<br>Flat Washer | Size  | Thread<br>Pitch, T <sub>p</sub> | No Washer/<br>Flat Washer | No Washer/<br>Flat Washer |
| 1/4   | 20                                | 101                       | 91                        | M5  | 0.8                             | 6.1                       | 5.5                       |
|   | 28                                | 116                       | 104                       |   | 0.5                             | 6.9                       | 6.2                       |
| 5/16  | 18                                | 209                       | 188                       | M6  | 1                               | 10                        | 9                         |
|   | 24                                | 231                       | 208                       |   | 0.75                            | 11                        | 10                        |
| 3/8   | 16                                | 370                       | 333                       | M8  | 1.25                            | 25                        | 23                        |
|   | 24                                | 420                       | 378                       |   | 1                               | 27                        | 24                        |
| 7/16  | 14                                | 593                       | 534                       | M10   | 1.5                             | 50                        | 45                        |
|   | 20                                | 662                       | 596                       |   | 1.25                            | 53                        | 47                        |
| 1/2   | 13                                | 904                       | 814                       | M12   | 1.75                            | 87                        | 78                        |
|   | 20                                | 1,020                     | 918                       |   | 1.25                            | 95                        | 86                        |
| 9/16  | 12                                | 1305                      | 1,175                     | M14   | 2                               | 139                       | 125                       |
|   | 18                                | 1456                      | 1310                      |   | 1.5                             | 151                       | 136                       |

## APPENDIX A - SHIPPING SPLITS, KICKPLATES

Figure 18 Shipping split, 625-800kVA Liebert eXL single-module UPS



**Figure 19 Shipping split, 625-800kVA Liebert eXL single-module UPS, continued****Table 15 Connections associated with top down view**

| Cabinet Start | Connector Label | Cabinet Finish | Connector Label | Duct |
|---------------|-----------------|----------------|-----------------|------|
| Input         | J100            | Bypass         | P100            | Rear |
| Input         | J13             | Bypass         | P13             | Rear |
| Input         | J200            | Bypass         | P200            | Rear |
| Input         | J300            | Bypass         | P300            | Rear |
| Input         | J11             | Core 1         | P11             | Rear |
| Input         | J400            | Core 1         | P400            | Rear |

**Table 16 Section J-J connections**

| Cabinet Start | Connector Label  | Cabinet Finish     | Cabinet Finish     | Duct |
|---------------|------------------|--------------------|--------------------|------|
| Input         | Core Prechg Ph A | Core 1 Prechg Ph A | Core 2 Prechg Ph A | Rear |
| Input         | Core Prechg Ph B | Core 1 Prechg Ph A | Core 2 Prechg Ph A | Rear |

**Table 17** Connections associated with sections in “View” column

| <b>Cabinet Start</b> | <b>Connector Label</b> | <b>Cabinet Finish</b> | <b>Connector Label</b> | <b>Duct</b> | <b>View</b> |
|----------------------|------------------------|-----------------------|------------------------|-------------|-------------|
| Bypass               | P20                    | Input                 | HVAB P20               | Front       | Section F-F |
| Input                | P1                     | Bypass                | BypassConnector Board  | Front       | Section G-G |
| Input                | P99A                   | Bypass                | CB2 I/F BD             | P99 Front   | Detail H    |
| Input                | P1                     | Core 1                | Core Connector Board   | Front       | Detail E    |
| Input                | P2                     | Core 1                | Core Connector Board   | Front       | Detail E    |
| Input                | P3                     | Core 1                | Core Connector Board   | Front       | Detail E    |
| Input                | P66                    | Core 1                | FIB 1                  | Front       | Detail E    |
| Input                | P1                     | Core 2                | Core Connector Board   | Front       | Detail E    |
| Input                | P2                     | Core 2                | Core Connector Board   | Front       | Detail E    |
| Input                | P3                     | Core 2                | Core Connector Board   | Front       | Detail E    |
| Bypass               | P99                    | Core 1                | FIB 1 P99              | Front       | Detail E    |

Figure 20 Kickplate installation—800kVA units

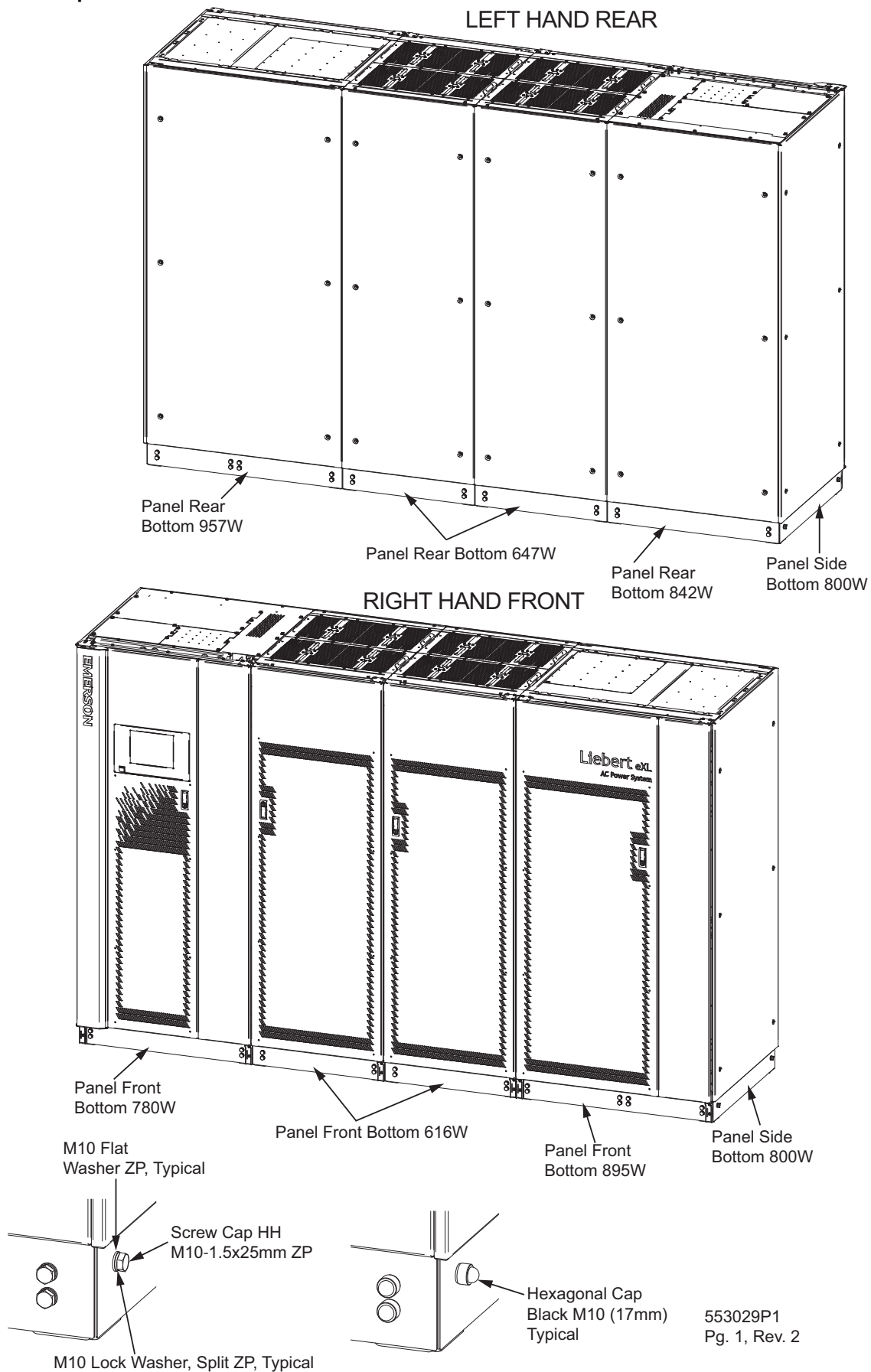
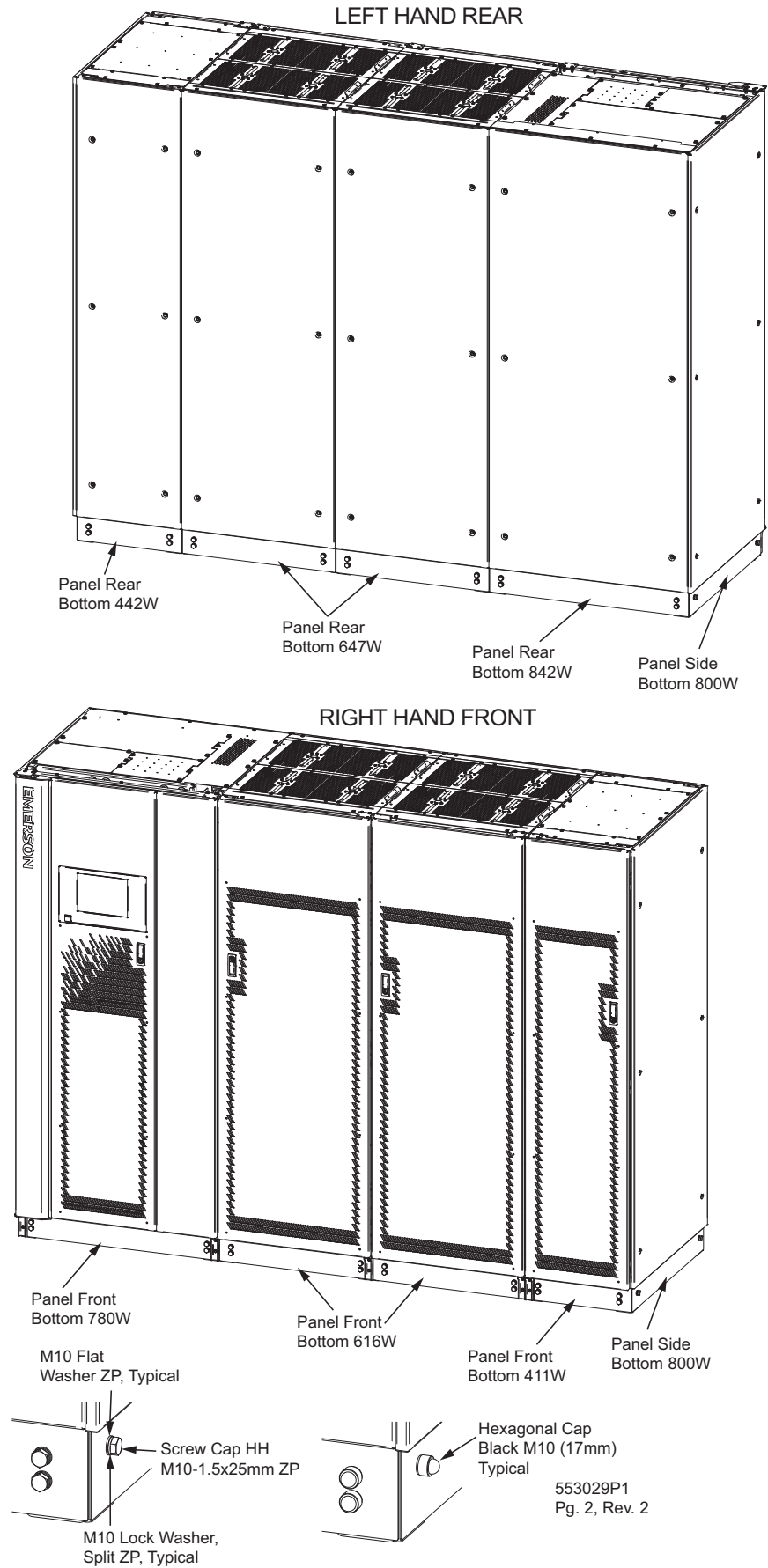


Figure 21 Kickplate installation—1200kVA units



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